A MONOGRAPH OF *CHARAXES* AND THE ALLIED PRIONOPTEROUS GENERA.

By THE HON. WALTER ROTHSCHILD and DR. K. JORDAN.

(Plates V. to XIVa.)

EVER since I began seriously to collect Lepidoptera, the section of the great family *Nymphalidae* which is treated of in this article has been a favourite of mine. About six years ago I began a monograph of these insects, but had to abandon my project from lack of material and want of time.

In recommencing a monograph of these interesting butterflies in conjunction with Dr. Karl Jordan, I feel more confident that I shall be able to place before entomologists a correct *résumé* of the work done, as my series from the Indo-Malayan, Papuan, and Australian regions has been rendered very complete by the labours of W. Doherty, the late Alfred Everett, A. S. Meek, and others; in fact the collection of *Charaxes* and *Eulepis* from the East upon which the following work is based is the most complete in the world. The African species are also very well represented in my Museum. The few forms not contained in my own collection have been examined and studied, either by Dr. Jordan or myself, in the collections of others.

I have specially to thank Dr. Staudinger, Messrs. G. Severin, H. Grose Smith, Weymer, Fruhstorfer, Suffert, Röber, Adams, Crowley, and Dr. Pagenstecher, as well as the officials of the British, Oxford, Berlin, and Dresden Museums, for their generous help. In most cases we were able to examine so large a number of individuals of each species and race that we could gather a definite and, I may say, correct opinion as to their distinctness or otherwise. There remain, however, two groups of forms about which considerable uncertainty exists. I am quite willing to admit that our classification of these two groups is open to discussion, but I think, with the material available at present for examination, our conclusions are much more reliable than any presented hitherto.

In both these groups the individuals give us no clue as to whether we are dealing with one polymorphic and very variable species or with a number of distinct though closely allied species. I think, however, that I shall show in the course of this monograph that the balance of evidence leans most decidedly to the side of polymorphism.

The two groups in question are *Charaxes etheocles* and its close allies, and *Charaxes polyxena* with its hosts of varieties and nearly allied forms. To finally clear up the question our field-naturalists in India and Africa must breed these insects not only from the egg, but from the eggs of a single *female*, so as to prove the range of specific, subspecific, and individual variation. It is to be hoped that collectors in North India and Africa will strive to carry on the fine work accomplished in Southern India, in the domain of biology, by Messrs. Davidson, Aitken, Bell, and others, who, owing to these researches, rank to-day among the foremost of Indian entomologists. Such researches alone can teach us the true solution of the problems presented by many of the North Indian and African forms, and they are not only of value to the student of zoology in the wider sense, but are of immense importance to the systematist pure and simple.

In the present monograph we have made a much more exhaustive study of the morphology of the group than is usually the case in works of this sort, but, although many important facts have come to light, the results have not always come up to our expectations. We have no such marked differences in the sexual organs or other parts in closely allied species occurring together, as the obvious distinctions to be observed in other groups of Lepidoptera. Hence the comparison of the sexual organs of doubtfully distinct species affords little help. In *Charaxes* and allied genera these organs are, moreover, subject to some individual variation. These points will be shown fully while describing each separate species, and are also more extensively discussed in Dr. Jordan's generalization.

We know comparatively little about the life-history of this interesting group, as the earlier stages of very few of the species have been discovered and recorded. A very extensive field thus opens itself before the practical naturalist-collector, and a great number of enigmas of which he alone can supply the solutions remain to be investigated and solved.

The results we have arrived at in regard to the relationship of the various *Charaxes*, etc., are very often at variance with those of other writers on the subject; but we hope to justify our contentions, not only by bringing forward many new facts, but also by more correctly interpreting those already known.

I have accepted the name *Charaxes* for the greater part of the group of *Nymphalinae* we are treating of, it being the oldest **unoccupied** generic name of which one of our insects is the type. The type of *Charaxes* is the Palaearctic species *jasoni*.

For a long time the term *Nymphalis* was applied to our insects instead of *Charaxes*, but this was an error; for the name *Nymphalis* was used and diagnosed by Linnaeus in 1758 as a subgeneric term for a section or phalanx of the genus *Papilio*—thus "*Papilio Nymphalis*"—and this phalanx did not include among its numbers any of our actual group, for the only one known to Linnaeus in 1758 was our present *Eulepis pyrrhus*, which he placed among his "*Papilio Eques*."

The term *Nymphalis*, it is true, was clearly intended as a sectional name by Linnaeus, as the headings to the pages in his *Systema Naturae* distinctly prove; and it must be applied to one of the numerous genera into which his great phalanx "*Papilio Nymphalis*" has since been split up. But it is equally certain that it cannot be applied to the insects we are discussing.

In 1805 Latreille gave *Nymphalis* the rank of a genus, including in it the "*Papilio Eques Achicus jason*" of Linnaeus described in 1767.

In 1806 Fabricius united *jason* and *pollux*, with a number of other Nymphalid butterflies, under the generic title of *Paphia*, a name already preoccupied by Lamarck in 1801 for a genus of Molluses. As *Nymphalis* was also preoccupied (by Linnaeus), Ochsenheimer was correct when in 1816 he separated *jason* from Linné's "*Papilio Eques Achivus*" under the new generic term *Charaxes*.

Shortly after, Hübner distributed the species congeneric with *jason*, *athamas*, *decius*, and *eurinome* over a number of his genera (the word "coitus" is employed by him instead of "genus"), namely *Tigridia* (type: *aeeste*, Cram., *Pap. Exot.* t. 121. f. E. F), *Eriboea* (type: *brutus* Cram., *l.c.* t. 241. f. E. F), *Doxocopa* (type: *erminia* Cram., *l.c.* t. 196. f. A. B), *Cova* (type: *varanes* Cram., *l.c.* t. 160. f. D. E) *Palla* (type: *decius* Cram., *l.c.* t. 114. f. A. B), and *Euxanthe* (type: *eurinome* Cram., *l.c.* t. 70. f. A).

In 1820 Billberg published the nondescript name *Polyura* as a generic term

for *jason* and *pyrrhus*, giving *Paphia*, *Charaxes*, *Nymphalis*, and *Papilio* as synonyms. In 1832-33 Swainson erected his genus *Jasia* for *jason*, and in 1841 Blanchard put *varanes* into his genus *Phyllophasis*, together with an American Nymphalid.

In 1842 Lucas described *Godartia* with *madagascariensis* as the type, while in 1850 Westwood, disregarding Hübner's terms *Palla* and *Coea*, which he gives as synonyms, invented the term *Philognoma* for *varanes* and *decius*. In more recent times Kirby put *varanes* into *Palla*, Mabille proposed the term *Monura* for *zingha*, and Moore divided the Indian species into four genera, employing the term *Charaxes*, inventing two new names, *Haridra* and *Murwareda*, and accepting by mistake the word *Eulepis*, first used by Billberg in 1820 as a "nomen nudum" for something else; while Butler in 1895 united under one name *Charaxes* all the species of our *Charaxes* and *Eulepis*, inclusive of true *Palla*, but exclusive of *zingha*. Of the eighteen generic terms used subsequently to Linnaeus to designate the various species treated of in this paper (namely *Nymphalis*, *Paphia*, *Charaxes*, *Tigridia*, *Eriboea*, *Coea*, *Palla*, *Doxocopa*, *Euxanthe*, *Polyura*, *Jasia*, *Phyllophasis*, *Godartia*, *Philognoma*, *Monura*, *Haridra*, *Eulepis*, and *Murwareda*), only four will be able to stand, together with a new genus, the others being reduced to synonyms or synonyms "pro parte." There are, among the insects we are examining, to my mind only five genera whose limits can be sharply and logically defined, the types of which are respectively *athamas*, *jason*, *eurinome*, *trojanus*, and *decius*; the distinctions on which the remaining "genera" are founded not being such as to warrant generic separation, the chief distinguishing characters employed being the extremely variable outline of the wings.

To the two species of the genera in question known to Linnaeus in 1767, Cramer added fourteen more, two from the East (*polyxena*, *eurgalus*) and twelve from Africa (*varanes*, *zingha*, *pollux*, *pelias*, *castor*, *brutus*, *lucretius*, *etheocles*, *tiridates*, *xiphares*, *decius*, *eurinome*). Goeze, who gave names to all those figures of insects of Seba, *Thesaurus IV.*, which he thought to be unnamed, added only one new name, *canomaculatus*, which falls (fortunately) as a synonym of *pyrrhus* (Seba's figure represents *pyrrhus*, not *sempronius*, as Mr. Kirby says in *Cat. Diurn. Lep.* p. 748). Drury in 1782 described and figured five more species, one from China (*athamas*) and four from West Africa (*laodice*, *eudoxus*, *anticlea*, and *cupale*), besides naming and figuring some forms which had already been baptized by Cramer. Fabricius added to the list, in 1781 and 1793, *fabius* from India, *bernardus* from China, and *sempronius* from Australia, so that at the end of the last century six Indo-Australian and eighteen African forms were known (not one from Madagascar). In the course of this century the number has been increased enormously, especially in the sixties by Hewitson, Butler, and Felder. The number of distinct species of the five genera is at the present time over one hundred and twenty, and the greater proportion of the species is, moreover, split up into more or less well distinguished subspecies. More than two-thirds of the species are African, while the rest belong to the Indo-Australian regions, one species of African type inhabiting the Mediterranean countries of the Palaearctic region. America has no prionopterous allies of *Charaxes*.

An account of the Geographical Distribution of the species will be given at the end of the monograph, as the results will be better understood when the reader has become acquainted with the insects in question, and there will be given also a *résumé* of the individual variability, the sexual, seasonal, and geographical variation.

All we will say here is that seasonal variation cannot be studied without having properly dated material; most collectors do not give the date of capture of their specimens, in fact one rarely meets with properly dated specimens in otherwise important collections of exotic Lepidoptera. But this is not so much the fault of the field Lepidopterist, who, if properly instructed, could easily give the date of capture of each specimen on the paper, as of the home Lepidopterist who does not give the proper instruction, being satisfied with receiving the name of the locality (which many collectors do not even put on the specimens!). Amongst the material which was placed at my disposal, that obtained by Dr. Ansorge in East Africa, Dr. Roth in the Niger Coast Protectorate, and by the late Mr. O. Möller in Sikkim, was of the greatest help to me on account of the careful labelling.

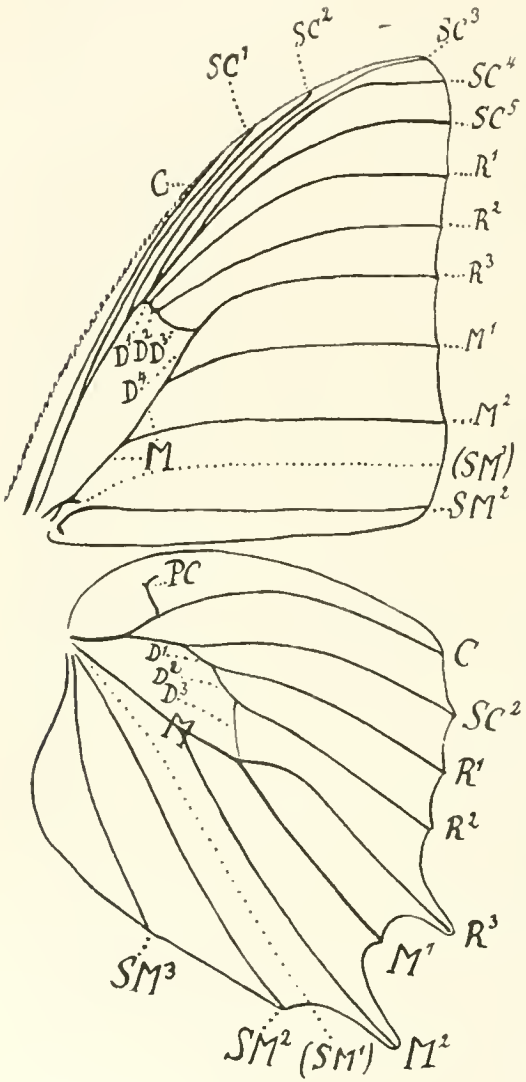

Fig. 1.

The nomenclature of the neuration adopted in this monograph is brought into accordance with the distribution of the tracheae in the pupal wing, and differs slightly from that usually employed in Great Britain. In the wing of the chrysalis we find five principal tracheae: (1) the costal trachea, which is simple, sending out only a very thin branch near the base; (2) the subcostal trachea, with five branches; (3) the radial trachea, with three branches; (4) the median trachea, with two branches; and (5) the submedian system of four tracheae. The basal portion of the radial trachea becomes obliterated, and the radial branches are joined to each other and to the subcostal and median tracheae by means of secondary transverse tracheae. Thus the upper radial branch becomes united with the subcostal system by a trachea developing from a subcostal branch, while the lower radial is joined to the median system by a branch thrown off from the upper median trachea, facts which have been made known by the researches of Haase, Spuler, and others. In the wing of the imago, the

connecting veinlet between the subcostal system and the upper radial vein is generally called the upper discocellular vein; the veinlets connecting the first radial with the second and the second with the third respectively are named middle and lower discocellulars; while, very inconsistently, the vein connecting the lower radial with the upper median nervule is considered an upper section of the median nervure. However, if the transverse vein between the subcostal system and the first radial, which has developed from the subcostal system, is termed upper or first discocellular veinlet, the connecting veinlet between the third radial and the median system should consequently be called fourth discocellular.

The upper submedian vein is in butterflies not developed, but the place where it stands in other Lepidoptera is indicated by a fold in the wing; the extreme basal portion of the submedian nervule is developed in *Charaxes* and allies, forming the so-called "spur" of the median nervure. In the descriptions the same designations for the veins will be used as in the accompanying diagram (Fig. 1):—

PC = Praecostalis;
C = Costalis;
SC = Subcostalis, with five branches, SC^1 to SC^5;
R = Radialis, with three branches, R^1 to R^3;
M = Mediana, with two branches, M^1 and M^2;
SM = Submediana, with two resp. three branches, (SM^1) to SM^3,* the brackets of (SM^1) indicating that the

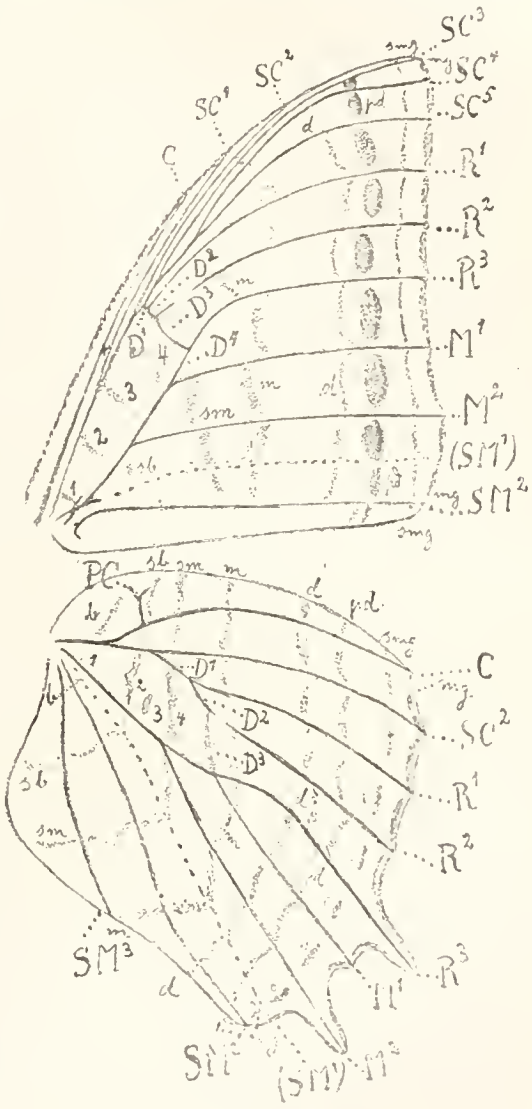

Fig. 2.

* It is perhaps necessary to point out that I count the branches from the costal towards the internal side, not in the reverse direction. In the Revision of the Eastern Papilios I have adopted the usual nomenclature of the neuration, and counted three median branches on the forewing, designating them as first, second, and third branch, the first being the most costal of the three. Herr F. Röber reproaches me with having said that in *Papilio blumei* ♂ there is a hairy streak on the second and third median branch, while, according to Röber, it should be the first and second. Well, the fact is that Röber's first and second are my second and third, Röber counting the branches from the internal side, and I from the costal side (see *Ent. Nachr.* XXIII. p. 223 [1897]).

vein is not developed, its place being, however, recognizable, and its influence upon the pattern being the same as if the vein were developed :

D^1 to D^4 = Discocellulares.

The edges of the forewing will be called **costal, distal,** and **internal,** those of the hindwing **costal, distal,** and **abdominal.**

The length of the costal margin is measured from the base of the costal nervure to the farthest point of the distal margin in the costal region of the forewing, or to tip of C^1 of the hindwing, the length of the internal margin from the same point to the tip of SM^2. The length of a tail is measured from the tip of the tail to a line connecting the two lowest points of the sinus before and behind the tail.

To simplify the descriptions of the insects of this monograph and to allow of an exact comparison between the pattern of the different-looking species, I shall employ the same nomenclature for homologous markings in the different species (Fig. 2). For the present it will be sufficient to say that the significance of the markings will be better understood with than without such a nomenclature ; a comparison of the pattern of the various insects of this paper will be given later. The underside has the more generalized pattern, consisting in *Charaxes*, *Eulepis*, and *Palla* of **bars** between the veins, which I designate as :—

the four **cell-bars** (1 to 4 in figure),
„ **discocellular** bar (5),
„ **basal** series of bars (b),
„ **subbasal** „ „ „ (sb).
„ **submedian** „ „ „ (sm),
„ **median** „ „ „ (m),
„ **discal** „ „ „ (d),
„ **postdiscal** „ „ „ (pd),
„ **submarginal** „ „ „ (smg),
„ **marginal** „ „ „ (mg).

The interspaces between the series of bars are designated from the base to the distal margin as **basal, subbasal, submedian, median, discal, postdiscal, submarginal,** and **admarginal** interspace, the interspace receiving its name from the series of bars at its distal side. At the proximal side of the submarginal bars of the hindwing there is nearly always a series of white dots. The discal interspace is very often light-coloured, forming the so-called discal or median band of many *Charaxes*. All the bars are more or less obviously edged with white or plumbeous.

I shall also use some very convenient terms proposed by F. E. Schulze and widely employed in comparative morphology, namely **proximal** for what is nearer the body, in opposition to **distal** for what is farther from the body, and pointing **proximad, distad, costad, internad,** for what points or runs towards the proximal (= basal) part of the wing (or the distal, or the costal, or the internal, respectively). Each single marking will conveniently be designated by giving the name of the series to which it belongs and the designations of the veins between which it stands ; thus submedian bar $M^1 — M^2$ means the submedian bar that stands between the upper and lower median nervule, and bar D^3 the bar upon the third discocellular veinlet.

W. R.

NOTES ON THE MORPHOLOGY OF *CHARAXES* AND ALLIES.

When Mr. Rothschild asked me to give an account of the morphology of *Charaxes* and allies, he did so with the special view of ascertaining such facts as might help, on the one hand, to define the genera that form the subject of this monograph more accurately than had hitherto been done, and, on the other hand, to find out the affinities of the species within each genus. As the object of this account is thus restricted, I have dealt with those parts of the body only which exhibit peculiar characters that can be understood without an extensive comparison with the structure of other butterflies and of which the bearing on classification is also more obvious. Besides the wing, I have taken into account the structure of the legs and the end of the abdomen, in so far as these parts furnish distinguishing characters which are of value for the purposes to be served by this monograph.

It is well known that the scales of the wings are arranged in rows which run at right angles (or nearly so) to the veins. On the upperside the veins of *Charaxes* and other Nymphalids are little prominent in the outer region of the wing, being longitudinally impressed, as shown by f. 10 (Pl. XIII.). The rows of scales run right across the veins, though the scales themselves are mostly more elongate upon and near the veins. The costal edge of the wing is somewhat thickened in front of the costal nervure, this vein-like thickening, or false vein, as well as the extreme edge of the wing being densely scaled in most Lepidoptera. In the denuded wing (Pl. XIII. f. 8, *Parthenos*) one sees the rows of scale-sockets extend close to the costal edge; the edge itself is entire, thin, membraneous, in the normal Nymphalid wing. The scales at the costal edge are strongly inserted and cannot easily be rubbed off.

On the underside the veins are convex, except the second submedian one of the hindwing, which is concave below. In most Lepidoptera the rows of scales cross the veins, as in f. 6 (Pl. XIII.), but in a great many instances, namely in most (not all) Lepidoptera with very prominent neuration, the veins are scaleless; in some cases the sockets of the scales, or the impressed punctures into which the scales are inserted, are still traceable, while in others (*Charaxes*, *Palla*, *Eulepis*, *Euxanthe*, *Papilio*, etc.) all traces of the scaling are lost on the veins, at least in the distal region of the wings. The costal edge of the forewing appears generally more vein-like below than above; the vein-like structure is divided by a furrow into an anterior narrow and a posterior wider portion. The rows of scales, which are regular, extend also below to the very edge of the wing (Pl. XIII. f. 9).

In *Eulepis*, *Charaxes*, *Euxanthe*, and *Palla* the costal edge has undergone a very peculiar modification, the edge not being entire, but serrate, as has been noticed by several authors (Trimen, Moore, etc.).* The rows of scale-sockets are seen in f. 3 (Pl. XIII.) to extend to the very edge of the wing, which is not membraneous as in f. 8: the scale-sockets are deeply impressed and the vein-like edge of the wing is somewhat raised behind them, so that in a view from above the costal margin appears serrate or toothed, the serration being formed by ridges running round the thickened costal edge to the underside. In *Euxanthe* and *Palla*,

* Snellen remarks in *Tijdschr. v. Ent.* XXXVIII. p. 15 (1895) that the serration of the costal edge of the forewing of *Charaxes* has, to his knowledge, not been noticed by other authors. Trimen, however, mentioned that peculiarity of "*Charaxes*" already in his *South African Butterflies*, ed. II.

as well as those species of *Eulepis* and *Charaxes* which are, in this respect, the less specialized ones, there are as many costal ridges or serrations as there are rows of scales between the costal nervure and the costal false vein. But in other species of *Charaxes* and *Eulepis*, for instance in *Ch. polyxena* and allies, there are less costal ridges than there are rows of scales in front of the costal nervure, as about one-fifth of the number of rows of scales do not reach the thickened edge of the wing (Pl. XIII. f. 5) in the middle of the costal margin. This further specialization is found to a much higher degree in a number of *Charaxes*, where of every two to three rows of scales only one extends to the costal edge, and this row is placed there in a deep groove (as it were), the hinder edge of which is very strongly raised, forming a sharp ridge pointing distad (Pl. XIII. f. 1).

On the underside the specialization is still more remarkable. The less specialized form of the costal edge occurs, as above, in *Palla*, *Euxanthe*, *Eulepis*, and a number of smaller *Charaxes*, nearly every row of scales reaching the edge of the wing: the serration appears, however, stronger than above (Pl. XIII. f. 4). The more specialized *Charaxes* have the number of rows of scales that reach the edge less, the sockets are less distinctly impressed on the false vein, the serrations are stronger and farther apart: while in the extreme forms only one out of every two to four rows of scale-sockets reaches the edge of the wing, and this row is very feebly or not at all marked upon the false vein (Pl. XIII. f. 2). The less the number of costal ridges is, the higher they are.

It is apparent from Pl. XIII. f. 1. 2, which show few scale-sockets on the false vein, and these feebly impressed, that the scaling of the costal edge of such a butterfly must be different from that of the butterfly represented on Pl. XIII. f. 8. 9, where the rows of scales extend to the wing-edge having the sockets well impressed. And we find, indeed, a further specialization in *Charaxes* and allies. In all the genera under consideration, *Charaxes*, *Eulepis*, *Euxanthe*, and *Palla*, the scales at the costal edge are rather loose, falling off easily, and the edge of the wing is, therefore, more or less bare of scales: in species with the edge so much specialized as shown in f. 1. 2 (Pl. XIII.), there are only a few long scales present close to the costal teeth, while the false vein itself is naked, a character that is very remarkable. As the scales are more easily rubbed off from a stiff part of the wing, like the costal edge of *Charaxes* and allies, than from a soft part that gives way when touched, the nakedness of the costal edge might be attributed to accidents to individual specimens. But that is not the true explanation: for, on examination of the wing of a freshly emerged *Ch. jasius*, I find that the costal edge is very sparsely scaled below, and even on the edge of a wing examined before the specimen had emerged from the chrysalis the scaling is sparse, though there are more scales than in specimens that have been at large.

The loss of scales in the costal region of the forewing below is in some *Charaxes* (*candiope* for instance) still more obvious in consequence of the obliteration of every second row of scales before the costal nervure, the remaining rows giving a peculiar aspect to that part of the wing. Intermediate between the serrate wing of *Charaxes* and close allies and the normal Nymphalid wing stands that of *Prothoë caledonia*, in which the costal edge is not serrate, but more or less denuded of scaling.

The gradation from the wing of *Palla*, *Charaxes fabius*, *Eulepis pyrrhus*, etc., to that of *Charaxes candiope*, *tiridates*, etc., is not complete, there being a break in the series, inasmuch as there is no complete transition from the edge on which

there are to every three serrations about four rows of scales resp. scale-sockets in the middle of the costal margin (Pl. XIII. f. 3. 4. 5), to that edge where we find at least two rows of scales to every single serration (Pl. XIII. f. 1. 2). We have, therefore, two groups of *Charaxes* in this respect, the one having the number of serrations agreeing more or less with the number of rows of scales before the costal margin, the other having about twice as many rows of scales as the costal edge has serrations. It is interesting to find that the second group, containing the most specialized forms in this respect, is confined to the Ethiopian region, inclusive of Madagascar, with one offshoot in the Mediterranean countries of the Palaearctic region. The group includes the allies of *jasou*, *protoclea*, *ameliae*, *brutus*, *pollux*, *varanes*, *candiope*, *tiridates*, and, *jasou* being the type of *Charaxes*, represents the typical *Charaxes*. All the other African *Charaxes* (inclusive of *etesipe*), which are generally less robust and smaller than those of the second group, and all the Indian *Charaxes* and *Eulepis*, and the African *Palla* and *Euxanthe*, have the less specialized costal margin. It is, further, most instructive that the brown Indo-Australian species (*polyxena* and allies) are those which approach in the specialization of the costal edge nearest to the African *varanes* and allies, which they also resemble somewhat in pattern.

The specializations of the costal edge and the neuration here described are suggestive in another direction. A comparison of the rows of scales before and behind the costal nervure shows that the excess in number of the rows of scale-sockets over the costal serrations is certainly due to the obliteration of scale-rows at the edge of the wing, not to an increase of scale-rows in front of the costal nervure. As the number of serrations is smallest in those species where they are most prominent (*tiridates* for instance)—the same wing has the serrations also more numerous and less prominent distally than proximally—and as, further, in such species there is scarcely any trace of scale-sockets on the false vein, it is evident that there is some connection between the height of the serrations and the obliteration of scaling, and from this we can safely conclude that the development of serrations has been dependent, at least to some extent, on the obliteration of rows of scales at the costal edge. If we now take into consideration the fact mentioned above, that in *Charaxes* and allies, *Papilio*, many moths, in short in many Lepidoptera with prominent neuration, the veins are on the underside devoid of scaling, it suggests itself that the thickness of the veins might be the direct cause of the non-development of scale-sockets and scales ; but this cannot be true, because there are many heavy-veined Lepidoptera which have the veins scaled below. The nude-veined Lepidoptera are for the most part quick-flying insects, among them being the most rapid-flying butterflies, such as *Charaxes*, and quick flight requires strong venation. Now, if such rapid-flying Lepidoptera are inhabitants of bush and forest locality, the costal edge of the forewing and the prominent veins of the underside come often into contact with branches and leaves, when the insect darts away. In the individual *Charaxes* the traces of the friction are very apparent, and *Charaxes* are known to dash their wings literally to pieces in their headlong flight. As rapid-flying insects, like *Sphingidae*, which inhabit open country, and are, moreover, dexterous fliers, have the costal edge not thickened, not serrate, not denuded of scales, and have the veins below also scaled, it would not be far-fetched to say that the habit of *Charaxes* gives an explanation of the peculiarity of the costal edge and the nudeness of the veins of the underside. For it could be urged, from a Lamarckian point of view, that the loss of scaling by friction had become hereditary, and that the dashing of

the costal margin against foreign objects had led to increased vigour of this part of the wing, and consequently to a thickening of the originally normal edge; but this explanation would leave out of account the development of serration. On the other hand, it might be advanced that the scaling offered a protection to the costal edge, and that this protecting scaling becoming rubbed away and the edge exposed to danger, those varietal specimens hence being the better provided in which the edge was thicker and which had another kind of protection, namely the ridges or serrations, selection had set in and led to the present stage of development. But this would merely mean pushing the origin of the character back to the stage when it was an individual varietal character for which Natural Selection does not give an explanation. To understand the meaning of the serration it will be necessary to refer to other wings with serrate costa: the wing of the Pierid genera *Prioneris*, *Belenois*, *Callidryas*, in which the *male* has the costal margin of the forewing dentate, of the Papilios allied to *phaëton* of which both sexes have a serrate wing, will perhaps help to elucidate the biological significance of the serrations and their causes, a question I shall have to enter upon more fully in another place.

The wings of *Charaxes* and allies exhibit a second structure which, although not peculiar to these genera, is of importance as a striking and easily discernible distinguishing character. In nearly all Lepidoptera the scaling of that portion of the underside of the forewing which is covered by the hindwing is markedly different from the scaling of the disc, as every Lepidopterist knows; the scaling near the base being, moreover, different from that of the outer three-fourths of the internal marginal area. In *Nymphalidae* we find always a basal patch of peculiarly modified scales at the internal margin, variable in length and width and of a silky appearance, consisting of triangular scales that stand more or less erect, or, at least, are not lying flat as those on the disc, and are shorter and narrower than the normal scales. Such a triangular scale is represented by f. 13 (Pl. XIII.), showing the peculiar character of the striation; while f. 14 (Pl. XIII.) represents a more normal, but non-dentate, scale from near the basal patch. The corresponding patch at the base of the costal edge of the hindwing is well known. The patch of the forewing extends in *Nymphalidae* from the internal margin either to the submedian nervure SM^2, or beyond that vein to the submedian fold (SM^1). The difference in the extent of the patch is easily recognizable with the naked eye on account of the difference in the gloss of the triangular, half-erect, and the more normal scales. In all *Eulepis*, *Charaxes*, and *Euxanthe* (and many other *Nymphalidae*) the patch reaches to (SM^1), as shown in f. 11 (Pl. XIII.), while in *Palla* and *Prothoë* (and other *Nymphalidae*) the patch stops at SM^2, as shown in f. 12 (Pl. XIII.). The sexes are alike in the development of the patch. What the function of the patch is I do not know. It is not a stridulating organ, as vein SM^2 of the forewing protrudes too much, but it is possible that the scales are the covering of small glands which produce a fluid of specific smell serving as a guide to the sexes of the same species in recognizing each other. For the individual butterfly on emerging from the pupa cannot be supposed to have a knowledge of the distinguishing characters in pattern of the species to which it belongs, and to acquire this knowledge by means of the eyes is certainly a pretty difficult task, considering that the individual looks at its own wings under such a very small angle that it cannot recognize the exact position, size, and outline of the wing-markings; besides, in the case of sexually dichromatic and dimorphic species the knowledge of its own wing-pattern and outline would not help the *male* to find the conspecific *female*. It is certainly not conceivable that

Eulepis moori ♀ knows, or learns to know, the distinction between its own *moori* ♂ and the stranger *hebe* by means of the eye, and that *Charaxes protoclea* ♂ finds out by sight which of the white-marked *females* of its locality is its own *female*. There must be community in characters between the sexes of the same species that binds the cospecific individuals together; the "recognition character" must not only be perceptible, but, what is just as important, it must be intelligible to the individual that perceives it, making the stranger at once a "familiar" being. A "specific" odour common to both sexes would be such a recognition character, and the basal patch, so widely distributed in Lepidoptera, may possibly be a structure from which such an odour emanates.

We find, further, at the base of the forewing below, in the fork formed by the extreme basal portions of the median and upper submedian veins (M and SM^1), a small structure, more obvious in the typical *Charaxes* than in the others, which I believe to be also a glandular organ. SM^1 is free at the base, then fuses with M, and is soon thrown off again as "median spur"; basad of the SM^1 there is a concave fold, and between this fold and M the membrane of the wing is somewhat thickened, forming a flat tubercle that is impressed in the middle (G in Fig. 3); the tubercle, inclusive of the impression, is covered with many erect long scales, which form a kind of brush. In *Palla* the organ is rather more tuberculiform. It is present in both sexes of *Eulepis*, *Charaxes*, *Euxanthe*, and *Palla*, but I cannot say that it is confined to these four genera, though I have not seen it in other Lepidoptera.

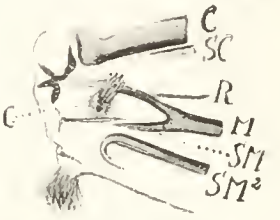

Fig. 3.

The neuration of *Charaxes* and allies presents several points of interest. *Euxanthe*, as is well known, differs from *Charaxes* in the subcostal system of the forewing; the peculiar development of the subcostals in the various species of *Euxanthe* will be fully dealt with under that genus. *Palla* agrees with *Charaxes*, except that the stalk of the subcostal fork of the forewing is longer. In *Eulepis* the cell of the hindwing is open, D^3 having disappeared, which does not occur in *Charaxes* and *Palla*, but in all true *Euxanthe*. Sometimes the upper portion of D^3 is vestigial, forming a short spur of R^2. The black line upon D^3 of *Charaxes* is also present in many *Eulepis* (not in *Palla*), and in this instance the marking has proved more constant than the neuration: but we must bear in mind that in the undeveloped wing of the chrysalis D^3 is represented by a trachea most likely also in *Eulepis*, and that the markings of the wing are developed largely according to the distribution of the tracheae of the pupal wing, as is plainly demonstrated by the subcostal fold and the markings near it, this fold being represented in the chrysalis by a trachea and in the more generalized Lepidoptera by a vein.

The position of D^3 of the hindwing is in *Charaxes* very variable according to species, sex, and even individual, the veinlet joining the median nervure either at the point of origin of M^1 (Fig. 12), or between M^1 and M^2 (Fig. 13), standing seldom a little beyond M^1 (Fig. 11). The genus *Charaxes* cannot, however, be split up into three natural groups according to the position of D^3, as widely different species may agree in that character, while closely allied ones do not. The most interesting fact now is that the sexes are often very different in the point of juncture of D^3 with M, the veinlet being in that case in the *female* always more basal than in the *male*. As the sexes are either different or not in the position of the veinlet, we have the following three cases to distinguish (with intergradations):—

(A) The veinlet D^3 stands between M^1 and M^2 in both sexes;

(B) The veinlet D^3 stands in ♀ between M^1 and M^2, in ♂ at point of origin of M^1 or close to it;

(C) The veinlet D^3 stands in both sexes at or close to the point of origin of M^1.

If in butterflies and moths the sexes are different in neuration, the discrepancy is mostly to be accounted for by the presence of special structures in the *male*, such as scent and stridulatory organs, or by a difference in the shape of the wing. In the case of *Charaxes* there must be another explanation of the difference of the sexes in the position of D^3 of the hindwing, for there are no structures in the *male* wing that could influence the position of that veinlet, nor do the wings of the sexes of *protoclea*, for instance, in which species the sexes differ in the position of D^3, deviate more from each other in shape than they do in *azota*, in which the veinlet is the same in position in both sexes. Hence it is obvious that the above cases (A), (B), and (C), with intergradations, represent stages in the mutation of the neuration of *Charaxes*; and it is further clear that the mutation began with forms in which the veinlet had the same position in both sexes, began either with (A) or with (C). As said on p. 449 of this volume, the question mostly so difficult to answer is not, Where is the road that Evolution has taken? but Which is the direction in which Evolution has traversed that road? Had the ancestor of *Charaxes* the veinlet as in case (A) or as in case (C)? Or in other words, considering (B), is the *female* the more advanced in mutation, or the *male*? So much is sure that mutation has been definite in the case of *Charaxes*, else there would be species in which the veinlet D^3 is more basal in the ♂ than in the ♀.

The accompanying diagrammatic figures show the position of the veinlet in question in a number of Lepidoptera the neuration of which may be taken as representing various stages in the evolution of D^3 and R^3 (but the Lepidoptera here referred to are not meant to be ancestral forms of *Charaxes*). In the chrysalis of a Nymphalid (Fig. 5) R^3 stands between M^1 and R^2, and a connection between R^3 and M^1 is brought about by the development of a trachea D^4 (punctured in Fig. 5) from M^1 that joins R^3; in a similar way R^1 becomes connected with R^2. In the wing of *Hepialus* (Fig. 4) D^3 and D^4 are readily recognized as transverse veins, while in *Papilio* (Fig. 6) D^4 appears to be a prolongation of M, D^3 remaining, however, more or less transverse, but pointing somewhat distad; in *Hestia* (Fig. 7) D^3 stands at right angles to the middle line of the cell, and in *Caduga* (Fig. 8) it is somewhat directed basad; *Calinaga* (Fig. 9) has the veinlet thinner, longer, and more oblique, and D^4 forms here a very blunt but distinct angle with R^3; in *Coenophlebia* (Fig. 10) D^3 is very thin, D^4 and R^3 form no angle, D^4 appearing to be the basal portion of R^3, and R^3 stands as in the preceding figures outside of M^1; in *Charaxes eupale* (Fig. 11) D^3 is very often placed just at the outer side of M^1, while in *Charaxes protoclea* ♂ (Fig. 12) it joins M at the point of origin of M^1 and in *protoclea* ♀ (Fig. 13) between M^1 and M^2. It is evident from these figures that the cross-vein D^3 is an accessory veinlet connecting originally the second with the third radial, there being in the more generalized Lepidoptera and in the chrysalis no direct connection between R^2 and M, and that the more basal position of that veinlet in the imago of *Charaxes* and *Palla* (and other *Nymphalinae*) is a later acquirement (the basad movement having taken place in connection with a shortening of the basal partition of the subcostal and a backward movement of R^3). Hence the *Charaxes* with the veinlet placed as in Fig. 13 are, in respect of this single character, younger than those *Charaxes* which agree with Fig. 11 and 12; and the development of the veinlet,

further, shows again that the *female* sex is, as repeatedly contended by me, in advance of the *male* sex.

We have thus recognized that the ♂ of *Ch. protoclea* (Fig. 12) is less advanced in that particular part of the venation than its ♀ (Fig. 13), and that also the species *protoclea* is less advanced than *azota*, which species agrees in both sexes with Fig. 13. Now in pattern the ♂ of *protoclea* is decidedly more specialized than the ♂ of *azota*; hence we have here a clear demonstration of the peculiar and very important phenomenon, which classifiers should always bear in mind, that one and the same species (*protoclea*) is in one character more specialized and in another character more generalized than its close ally (*azota*); speaking of a species or family as being more specialized than another does not mean that the higher specialization is found in all organs.

Fig. 4.

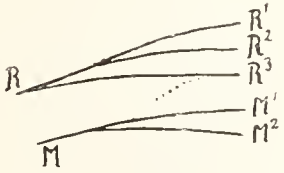

Fig. 5.

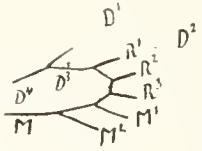

Fig. 6.

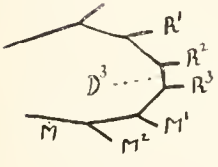

Fig. 7.

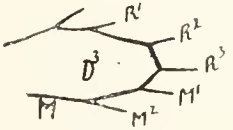

Fig. 8.

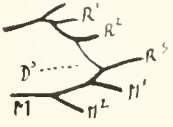

Fig. 9.

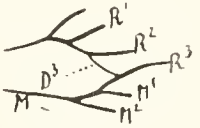

Fig. 10.

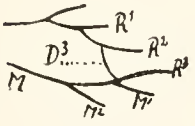

Fig. 11.

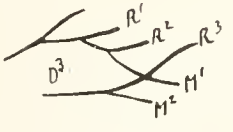

Fig. 12.

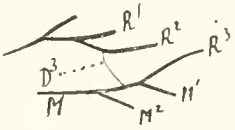

Fig. 13.

It is, further, of interest to note that all the Indo-Australian *Charaxes* have D^3 as in Fig. 12, that the African *Ch. varanes* and *fulvescens*, the pattern of which is in many respects generalized, agree also with Fig. 12, while some species with aberrant wings, like *zoolina*, and some of the larger sexually dichromatic species (*violetta*, *numenes*, *ameliae*) agree, at least in the ♀, with Fig. 13. *Palla*, with a specialized pattern, has the veinlet even more basal than it is in Fig. 13.

The legs of *Charaxes* and allies (Pl. XIII. f. 15—21) present also a few characters which must be mentioned here. The hinder and middle tibiae of *Eulepis*, *Charaxes*, and *Euxanthe* are spiny above and below, while in *Palla* the spines of the upperside are represented by short hairs which are concealed under the scaling. The upperside of the tarsi is in *Euxanthe* furnished with much longer spines than in the other genera.

The last tarsal segment (Sharp) bears above (as in other Lepidoptera) at the tip some long stiff hairs curved downwards (Pl. XIII. f. 16); their number varies from six to ten in the above genera, while in other *Nymphalinae* the number is sometimes reduced to four. In the smaller *Charaxes* and *Eulepis* there are generally six or seven apical bristles, while in the larger *Charaxes* there are mostly eight and in *Euxanthe* ten.

The underside of the last tarsal segment (Pl. XIII. f. 15) is flat, and is furnished on each side with two rows of spines; the external row of the outer side of the segment (right-hand side in figure) is in most *Charaxes* and *Eulepis* incomplete. This difference in the development of the two sides of the segment, exemplified also by the specimens that have seven instead of six or eight apical bristles, reminds us of the asymmetrical development of the more basal segments of the antennae which have only the outer groove developed, as explained on p. 408 of this volume. The incomplete development of the outer row of spines on the sole of the last tarsal segment may stand in correlation with the asymmetry of the tibiae and femora. I cannot here enter upon the question if the tarsal segment as represented by f. 15 (Pl. XIII.) is a derivation from a segment with both sides symmetrically furnished with spines, the outer row of the outer side having partly become obliterated, or whether the segment with four complete rows of heavy spines as found in *Charaxes tiridates* is the younger one. As the spines are developments from hairs they form as such a specialization, and hence it appears possible that the symmetrically spined *tiridates* segment represents a higher specialization than that of *Eulepis eudamippus* (Pl. XIII. f. 15), in which the outer row is not fully developed.

The sole of the last tarsal segment is not scaled in the middle, but covered with very short and fine hairs; the last but one segment has a few scales in the middle. There are also four rows of spines on the sole of this segment, but there appear (as on the three basal segments) some spines between the two rows of each side; the number of intermediate spines is mostly larger at the inner than at the outer side of the sole.

The anterior tarsus of the *male* is very variable in length; in *Euxanthe* it is, however, always very short, much shorter than in any species of the other three genera. Though it appears to consist of one segment only on account of the dense scaling, one finds, on removing the scales, that the tarsus is very often jointed; the tarsus varies individually from being one- to four-jointed. Sometimes there are some spines present, but most individuals examined by me were without them. The strong apical spines of the four posterior tibiae do not seem to be ever represented at the tip of the foretibia of *Charaxes*, though they are found in *Palla*. In *Euxanthe* the short and thick tarsus has the middle and apex below not scaled, and the tibia bears many thin bristles. The anterior tarsus of the *female* of *Charaxes* consists always of five segments (Pl. XIII. f. 17—19). The first segment is long, and appears slightly twisted in consequence of being asymmetrically compressed; the others are short, and symmetrically, more or less strongly, compressed. The underside of the first and second segments is more or less densely scaled, while segments 3 to 5 are not scaled beneath. The configuration of the ventral surface varies according to species and groups, especially the height and outline of the convex mesial portion of the sole. Segments 1 to 4 bear an apical pair of heavy and another pair of smaller spines, besides some small spines farther back, which vary in number individually, but are more numerous in the large African species of *Charaxes* (*tiridates* for instance) than in *Eulepis* and the smaller *Charaxes*. At

the base of segments 3 to 5 (very seldom on the second segment of *Palla* *) there is on each side a dense brush of stiff hairs, mostly of a buffish colour. These brushes are present in all *Nymphalinae*, but seem to have been overlooked. Hairs like those composing the brushes are widely distributed on the tarsi among Lepidoptera, but they are found in considerable numbers only in the *females*, and it is interesting to observe that they are not found on all the tarsal segments, nor on all tarsi, but occur commonly on the sole of the foretarsi and are here often massed together on the first segment. Thus we find, for instance, in the *females* of *Papilio* the sole of the first segment of the foretarsi densely covered with yellowish hairs, resembling the hairs of the tarsal brushes of *Nymphalinae*, while the middle and hinder tarsi of the *female* and all tarsi of the *male* are without such a clothing of modified hairs. The disparity between the sexes and between the foretarsi and the middle and hinder tarsi convinces me that these hairs have a special function confined to the *female*, and I think it probable that they have a sensory function which comes into play when the *female* is selecting plants for the deposition of the eggs.

The fifth segment of the *female* foretarsi of *Charaxes* and allies has no trace of the claws, but there is a membraneous organ inserted into the segment just below the apex and subdivided (Pl. XIII. f. 20, 21, *Palla*) which is a remnant of the pulvillus and paranychia ; one or two apical bristles are also generally present.

A greater variety of striking distinguishing characters is found in the segments of the abdomen, which are modified for sexual purposes, than in the legs. The ventral plates (sternites) of the seventh and eighth segments of the *female* have undergone modifications in connection with the vaginal aperture. In *Charaxes* and allies the generic and specific characters offered by these segments are not so conspicuous as in the case of *Papilionidae*, *Acraeinae*, and others, but are obvious enough to be of taxonomic value. In *Palla* the apical edge of the seventh sternite is raised into a double tubercle (Pl. XIVa. f. 31) in the middle ; the segment is also centrally strongly convex : the apical edge of the sixth segment is thickened and protrudes a little ventrad ; the eighth sternite bears basally a rounded mesial impression with two small tubercles at the bottom. In *Charaxes* (Pl. XIVa. f. 30) the two tubercles of the seventh segment are wanting, but the middle portion of the seventh sternite is in some forms (*etesipe* and allies) bulging out ventrad, forming, together with the basal impression of the eighth sternite, a rather large cavity (Fig. 14). In most species of *Charaxes*, *Eulepis*, and *Euxanthe* the seventh sternite is evenly convex, with the apical edge somewhat thickened, slightly incised or sinuate in the middle : the basal postvaginal groove of the eighth segment bears at the bottom a broad flat smooth tubercle ; the hinder edge of the groove is sharply marked and sinuate mesially. In *Euxanthe* the groove is larger than in *Charaxes* and *Eulepis*.

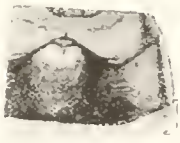

Fig. 14.

The end of the abdomen of the *male* is much more complicated than in the *female*, the ninth and tenth segments (sternites and tergites) being here strongly modified. The external part of the ninth segment consists in *Charaxes* and *Eulepis* of a narrow ring bearing on each side a flap-like movable plate, the so-called valve

* The first specimen of *Palla decius* ♀ I examined had the second segment of the foretarsi provided with a brush of hairs like that of the other segments, and I believed I had found a striking difference between *Palla* and *Charaxes* ; but all the other specimens I have examined since have the second segment without that brush. This shows how dangerous it is to rely on the examination of one example.

or clasper (ix. l on Pl. XIVa. f. 23). The ventral part of the segment is wider, being extended basad into a rounded rod-like hollow handle, the saccus (Peytoureau), and bearing close to the claspers a semicircular groove, the brim of which is more strongly chitinized (ix. v on Pl. XIVa. f. 26). The ninth sternite is also enlarged apicad, forming in the cavity laterally bordered by the valves a convex plate of chitine (Pl. XIVa. f. 26. ix. PF), which has the middle line more raised and is apically produced into a curved process (Pl. XIVa. f. 25. PF). In a lateral view (Pl. XIVa. f. 26) the convex plate ix. v is seen to extend dorsad laterally, thus forming a kind of half-cylinder, or rather funnel, that is closed above by the tenth segment (x. v) : from this funnel protrudes the penis (P). The size and shape of the opening of the penis-funnel, as well as the length, width, and curvature of the process, vary very much according to species or groups of species, as can be seen from Pl. XIVa. f. 37—42. In all *Eulepis* the mouth of the funnel is restricted to the base of the process (f. 37), the latter not being concave above, while in many *Charaxes* it extends to near the tip of the process (f. 39. 41).

The tergite of the tenth segment is soldered together with that of the ninth, forming a strongly chitinized smooth plate (x. d in f. 22—29 of Pl. XIVa.) of various shapes. The sternite (x. v) is less chitinized, has the sides basally dilated ventrad and dorsad, and hence appears convex above and below ; it is, however, generally raised in the middle line when the anus, that lies between the tenth sternite and tenth tergite, is closed. The tergite bears many hairs at and near its edge, while the sternite does not. While the outline of the tenth sternite (as seen from above or below) is generally more or less the same, varying from being more triangular to being nearly semicircular, the tenth tergite offers interesting differences in the various groups of species. We can distingnish two principal types in the shape of the tenth tergite. The first type (Pl. XIVa. f. 33) is rounded, with or without tooth at the apex : the tooth is seldom divided (Pl. XIVa. f. 34), which can happen in a species that has the tooth generally simple : here belong many *Charaxes* and *Eulepis*. The second type is represented by f. 36 of Pl. XIVa. : the tergite is apically produced into two teeth, and the division of the tergite in the middle line into two halves is often indicated almost down to the base : such a tergite is found in many *Eulepis*, *Charaxes*, and *Euxanthe*. It must be pointed out that species which are similar in the tenth tergite are not necessarily close relatives.

The valves are that part of the sexual armature which Lepidopterists generally make use of in the discrimination of species. In our case these organs are not such good guides as they are in other groups of Lepidoptera ; for I have often failed to find in closely allied species differences in the valves that hold good, for instance in *Eulepis athamas*, *moori*, *lebe*, *Charaxes brutus* and *pollux*, though these species are otherwise well separated and perfectly distinct. Identity in the valves in *Charaxes* and allies certainly does not mean that the respective insects belong to the same species.

The valve (Pl. XIVa. f. 26. ix. l) is produced apically into a hook which appears mostly to be twisted, as a ridge of the inner sheath of the valve, corresponding to the "harpe" of other Lepidoptera, is continued to the tip of the process. This form of the valve is found in the typical *Charaxes*, the brown Eastern forms, and others. In the species allied to *ethalion* the valve is also produced into an apical process, but the before-mentioned ridge turns towards the ventral edge of the valve just below the apical process, where it runs out into a strong, sharp, rather long hook, while in

etesipe and *achaemenes* there is a dorsal hook. *Charaxes zingha* has the twisted apical process, but, besides, in the middle of the ventral edge a long slender tooth; and *Ch. lichas* and *paphianus* have, besides a long apical hook, a sharp tooth upon the outer side of this hook.

The so-called penis (Pl. XIVa. f. 27. P) is often slightly angulated before the end (in the typical *Charaxes, jason*, etc.), or is straight (or nearly so); it represents a cylinder which is compressed at the end, bears the opening just before the apex, and has the apical portion membraneous ventrally in the middle line. The upper-side is provided with teeth which are directed distad: their position and number are often remarkably different in not closely allied species, while in close allies the penis armature is often the same. Thus in all *Eulepis* we find a solitary tooth before the apex (Fig. 15); in *fabius* and its relative *etesipe* the penis is dilated 1½ mm.

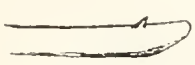

Fig. 15.

Fig. 16.

before the apex, and this dilated part is heavily denticulate (Fig. 16); in *Palla* the tip of the penis is slightly thickened and densely toothed; in *psaphon* and allies it is denticulate above (Pl. XIVa. f. 32); and so on. The function of these teeth seems to be to prevent the chitinized sheath (penis) of the ductus ejaculatorius going too deeply into the vaginal cavity, by catching hold of the wall of that cavity, so that, by further pressure upon the apparatus, the membraneous ductus ejaculatorius can protrude and enter the rather long duct of the so-called bursa copulatrix.

The most interesting part of the *male* apparatus is the penis-funnel, which I have found in *Eulepis, Charaxes*, and *Euxanthe*, **and only here.** It does not occur in any of the other relatives of *Charaxes*, such as *Palla, Anaea, Prothoë, Prepona*, etc., nor have I met with it in any other Nymphaline butterfly that I have compared.

In consequence of the absence of the penis-funnel from *Palla*, the opening for the penis in the membrane covering the ninth segment between the valves (Pl. XIVa. f. 29) is in a ventral view plainly visible, and it is apparent that the penis, when protruding, has a more ventral position than in *Charaxes, Eulepis*, and *Euxanthe*. This position of the penis may explain the difference in the shape of the valves of *Palla* and *Charaxes, Eulepis* and *Euxanthe*: in the latter three genera the hook-like process of the valve that serves to fix the sexes together is dorsal (Pl. XIVa. f. 24), while in *Palla* (Pl. XIVa. f. 27) the valve is produced **ventrally** into a long sharp hook (Pl. XIVa. f. 27. 28).

There are some more conspicuous points of difference between the two last segments of *Palla* and *Charaxes*, as will be seen by comparing figures 24 to 29 of Plate XIVa. The ninth segment is much larger than in *Charaxes*; the ventral portion is especially enlarged, covering the extreme base of the valves in a ventral view (Pl. XIVa. f. 29). The tenth sternite is rather slenderer than in *Charaxes*, and the tenth tergite is produced into a long, slender, very sharp and strong median hook. In this latter character *Palla* agrees with many *Nymphalinae*, while the divided tenth tergite of a number of *Charaxes* and *Eulepis* and of *Euxanthe* is quite exceptional.

K. J.

Genus EULEPIS.

Papilio Eques Achivus Linné, *Syst. Nat.* ed. X. p. 462 (1758) (partim).
Eriboea Hübner, *Verz. bek. Schmett.* p. 46 (1816) (partim).
Nymphalis, Godart, *Enc. Méth.* IX. p. 350 (1823) (partim); Doubl. Westw. & Hew., *Genera Diurn. Lep.* II. p. 306 (1850) (partim); Kirby, *Cat. Diurn. Lep.* p. 267 (1875) (partim).
Jasia Swainson, *Zool. Illustr.* II. t. 90 (1832) (partim).
Charaxes, Felder, *Neues Lepidopteron* p. 39, in *Nov. Acta Acad. Leop. Car.* XXVIII. (1861) (partim); Butler, *P. Z. S.* p. 622 (1865) (partim); Schatz, *Fam. und Gatt. Tagf.* p. 175 (1892) (partim); Butler, *Journ. Linn. Soc. Lond.* XXV. p. 339 (1896) (partim).
Eulepis Moore, *Lep. Ceylon* I. p. 29 (1881) (typus: *E. sumatha*).
Mucwaredu Moore, *Lep. Indica* p. 263 (1895 (typus: *M. dolon*).

Antennae rather sparsely covered above with **small narrow** scales: grooves of underside deep, extending from the base to the apex of the segments; last four or five segments considerably shorter dorsally than ventrally. Forewing, costal margin **serrate**: SC^1 and SC^2 before end of cell, SC^3 and SC^4 on a short stalk, SC^5 thrown off from SC^4, the latter bent below apex of wing; base of (SM^1) as spur of M; basal patch of scales extending to (SM^1). Hindwing, **cell open.** Cell of both wings never with more than **two** bars below. ♂ **with penis-funnel** which has the opening restricted to the base; penis with one tooth before apex.

The small scales of the antennae, the serrated costal margin of the forewing, the short stalk of SC^3 and SC^4, the bent apex of SC^4, the penis-funnel and median spur, represent a combination of characters nowhere else met with except in *Charaxes* and *Euxanthe*. From the latter genus *Eulepis* differs in many respects, for instance in the subcostals of the forewing being all free, while the resemblance between *Eulepis* and *Charaxes* is so great that most authors have merged the two together into one genus. It is true, the open cell of the hindwing distinguishes *Eulepis* at once from *Charaxes*, as pointed out by Moore, *l.c.* However, as the loss of D^3 of the hindwing is observed in many *Nymphalinae* which are not so closely related to one another as to forms which have the veinlet preserved, the obliteration having taken place independently, it can justly be urged that the absence of D^3 from the species united here under *Eulepis* does not necessarily warrant their being a group of close allies which stand apart, in a phylogenetic sense, from all the species of *Charaxes*. Butler, indeed, brings (*l.c.*) *Charaxes hadrianus*, on account of its white colour, among the species called by us *Eulepis*, and considers another true *Charaxes*, namely *nitebis*, to be a transition from the allies of *pyrrhus*, which is an *Eulepis*, to the allies of *psaphon*, which belongs to *Charaxes*, though both *psaphon* and *hadrianus* have the cell of the hindwing perfectly closed. But there are other specializations which confirm Moore's opinion of the generic distinctness of *Eulepis*, and which show that there is in several respects a great uniformity in the development of the species of *Eulepis*.

The antennae are like those of *Charaxes*; the last three to seven joints are nearly always rufous brown, seldom brownish black. The costal edge of the forewing is never so highly specialized as in the large species of *Charaxes*, there being, in the basal half of the wing, nearly as many serrations as there are scale-rows in front of C, although *Eulepis* contains forms larger in size than the largest species of the typical group of *Charaxes*.

Of the four cell-bars of the diagram of the *Charaxes* pattern (Fig. 2, p. 549) only two are found in *Eulepis* on the forewing, namely bars 3 and 4, and one (bar 4) on the hindwing; in a number of forms bar 3 of the forewing has also

disappeared ; in *E. gamma* only there is a vestige of cell-bar 2 on the hindwing. There are no remnants of the other cell-bars in any of our *Eulepis* specimens, and this is the more remarkable as the bars are in many *Eulepis* extremely heavily marked (*E. pyrrhus*, *hadeni*, etc.). There is one group of *Charaxes*, namely the species allied to *mycerina*, which agrees with *Eulepis* in the number of cell-bars, but differs in the further development of these bars; for the fourth cell-bar of both wings of the more specialized *Eulepis*, together with the submedian and median bars, form two more or less continuous lines, which include between themselves a generally brown or yellowish brown band that is curved basad, pointing at least towards the anal angle of the wing, while in *Charaxes mycerina* the band is curved distad. The median bars (SM^1)—SM^3 of the hindwing stand, taken as a whole, at right angles to SM^2, inclining basad posteriorly.

The discal interspace (see p. 550) is white on both wings, forming a white discal band : only in two forms (*E. epigenes* ♂, and sometimes in *E. caphontis* ♂) is the white band extremely reduced. The postdiscal and submarginal interspaces of the forewing, or at least a portion of them, have developed white spots, and in many cases the larger portion of the ground-colour of both wings, especially of the underside, has become white. The postdiscal interspaces of the hindwing are more or less uniform; the discal and postdiscal bars are generally arched, and the two of the same cellule often joined together.

The hindwing has two tails, the second of which is sometimes a mere tooth.

The outer row of spines at the outer side of the sole of the first segment of the middle and hinder tarsi is incomplete even in the large species of *Eulepis* (see p. 558).

The penis-funnel (Pl. XIVa. f. 37) has in all *Eulepis* the projecting part not concave above, the mouth of the funnel being restricted to the base of the hook: in this character *Eulepis* differs obviously from *Charaxes* which have at least the basal half of the process hollowed out above (Pl. XIVa. f. 39. 41). The penis is in *Eulepis* also very uniform in shape, all the species agreeing in having a slender penis with a single rather prominent tooth before the apex (Fig. 15), while the form and dentition of the penis of *Charaxes* are very variable in the various groups of species.

The egg seems to agree with that of *Charaxes*, judging from the eggs taken from the bodies of cabinet specimens. The larva and pupa are also not structurally different from those of *Charaxes*.

The genus *Eulepis* is confined to the East, but is found there from Ceylon, Kulu, China and the Loo Choo Islands, over the islands of the Malay Archipelago, Australia, Solomon Islands to New Caledonia and Fiji. The habits of the species agree on the whole with those of *Charaxes*.

Mr. Moore (*l.c.*) separates from *Eulepis* a number of larger species, to which he gives the generic term *Marwarcda*. The characters upon which this Moorean genus is based are, however, wholly unreliable.

The name of *Eulepis* was introduced by Moore (*l.c.*) by mistake, as said above. The word *Eulepis* appears first in Billberg, *Enum. Ins.* p. 80 (1820), where we read :

"G. Eulepis Dlm. (Mss.)—*Nymphidium* Fbr.—*Lemonias* Ill. -*Papilio* et *Hesperia* ol.

athamas. Eg. 36."

The species *athamas* has been considered to be Drury's *athamas* ; but from the

remark "Eg. 36" = Ego, species nova tredecima et sexta, and from the synonyms behind "*Eulepis*," and further from the fact that this *Eulepis* is in Billberg's classification a genus of "Zephyriides," corresponding to our *Lycaenidae* and *Erycinidae* (including a Hesperiid), it is clear that Billberg's *athamas* was in Billberg's opinion a new species, and certainly not the Nymphalid *athamas* figured by Drury. Billberg's name is a nondescript, has therefore no defined meaning, and hence is no generic term; the word "Eulepis" was accordingly free in 1881 to be employed in zoology as a generic name for the Nymphalids we are dealing with. The "author" of *Eulepis* is of course Moore, not Billberg or Dalman; not the coiner of the word, but the publisher of it as a defined scientific term, is the "author."

The species of *Eulepis* can be separated into three groups according to the development of the pattern, represented respectively by *pyrrhus*, *eudamippus*, and *delphis*; each group can of course be subdivided, down to the varieties.

In the first group (I.) the two bars of the cell of the forewing below have preserved their original character as transverse bars, both being heavy and not interrupted: the (submedian and) median bars R^3—SM^1 of the forewing are not continuous.

The second group (II.) comprises the species in which cell-bar 3 of the forewing has partly or totally become obliterated, and in which the median bars R^3—SM^1 are more or less continuous, forming the outer border of a band.

The third group (III.) contains only one species, *delphis*, which has cell-bar 3 interrupted as in group II., but has preserved an ancestral character not found in group II. and met with only in one generalized form of group I. (namely *E. gamma*); namely, while in groups I. and II. bar M^1—M^2 of the hindwing runs more or less in the direction of M^2, forming a very small angle with this vein, the bar is in *delphis* more transverse, as it certainly was originally in the ancestral forms of *Eulepis* and *Charaxes*, and as it still is in some *Charaxes*. Moreover, in group II. bar D^2 of the hindwing is always wanting, whereas it is found in *delphis* and in a number of forms of group I. Median and submedian bars M^1—M^2 of the forewing, forming in *delphis* generally a ring, are here more distal than in the species of group II., a position which is found in the species of *Charaxes* with a more generalized pattern. These characters of *delphis* do not admit its derivation from groups I. and II.; in other respects the pattern of *delphis* is so highly specialized that groups I. and II. cannot have developed from a *delphis*-like ancestor. Hence we have to consider *delphis* as having independently developed from the common root of all three groups of *Eulepis*.

I. Forewing below with cell-bars 3 and 4 complete; median bars R^3—SM^2 not forming a continuous line, median bars SC^2—R^3 present.

A. Submedian and median lines of bars of hindwing parallel (or nearly so), not merged together at M.

a. Postdiscal interspaces of hindwing, at least the last three, *above* occupied by creamy or rufous red spots.

1. **Eulepis caphontis** (Fig. 17, 17A, ♂).

Charaxes caphontis Hewitson, *Ex. Butt.* III. *Charaxes* t. 3. f. 14. 15 (1863) (Pt. Denison, Australia, *loc. err.*); Macleay, *Tr. Ent. Soc. N. S. Wales*, I *Proceed.* p. 27. note (1865) (Fiji, not Pt. Denison); Butl., *P. Z. S.* p. 632. n. 38 (1865) (Fiji); id., *l.c.* p. 280. n. 39 (1874) (Fiji); id., *Journ. Linn. Soc. Lond.* XXV. p. 388. n. 108 (1895) (Pt. Denison, Australia, *loc. err.*).

♂. *Body* above olive-black, below greyish broccoli-brown, underside of palpi

paler ; head with four creamy dots above ; eyes thinly bordered with creamy scales behind ; club of antenna rufous brown beneath, apical segments of same colour also above.

Wings, upperside.——Forewing black, olivaceous towards base ; a discal and submarginal series of creamy white spots ; discal spot R^2—R^3 close to cell, minute, often absent ; spot R^1—R^2 often a third the size as in Fig. 17 : last spot suffused, of an olive-buff tint on account of the scales of the under layer being black instead of white : submarginal spot SC^4—SC^5 mostly absent, third spot also seldom marked ——Hindwing brownish black ; a discal olivaceous buff or pale glaucous band down to M^1, of nearly even width (about 2 to 3 mm. at R^1), sometimes interrupted at SC^2, followed by a complete series of postdiscal rufous red spots, 1 small, 2 rounded, 3 oblong, 4 linear, 5 the largest and, like 6, concave distally, 7 and 8 forming a double spot resembling the number 3 ; submarginal creamy white dots from C to SM^2, upper two more or less rounded, the others linuiform, dots M^1—SM^2 very thin ; admarginal interspaces occupied by reddish rufous bars which are separated from each other at the veins, bars R^1—M^1 with pale glaucous scaling near

Fig. 17.

Fig. 17a.

veins ; fringe white, except at tips of veins ; abdominal fold unicolorous, faintly paler than wing ; upper tail barely 3 mm. long, second tail a very short tooth.

Underside : various shades of hazel and chestnut.——Forewing : cell-bar 3 slightly dilated at the ends, bar 4 more or less arched, dilated at upper end, where it is generally joined to bar D ; submedian bar M^1—M^2 short ; median bars R^2—SM^2 linuiform ; discal bars rather feebly marked, bar R^2—R^3 more proximal than the others ; internal marginal area blackish, this colour often extended over a greater part of the wing ; interspace between the two cell-bars partly whitish or clayish vinaceous cinnamon ; discal and postdiscal white spots as above, but larger, the anterior ones generally shaded with brown, hence appearing nearly vinaceous cinnamon, not white.——Hindwing : submedian line of bars crossing M at origin of M^2, slightly bordered white proximally ; median line of bars just beyond base of M^1 convex, costal bar more basal than the others, bars (SM^1)—SM^2 not at right angles to SM^2, but pointing more distad than in *pyrrhus* : bar D^1 marked ; interspace between submedian and median lines more reddish than abdominal region of wing ; discal white band gradually narrowing from C, where it is 4 mm. wide, to abdominal margin, the white scaling often replaced by blackish chestnut from C to R^2 and by pale brown behind (Fig. 17a) ; postdiscal rufous red spots nearly as above, 2 and 3 orange, 4 linear,

sometimes obsolete, all with black and blnish white proximal borders; submarginal white dots as above, the last ones minute or obsolete, followed by the heavier black submarginal spots; admarginal reddish rufous spots transverse, separated from each other.

♀. Resembles the ♂; body beneath more whitish, underside of palpi cream-colour. Wings *above* somewhat paler brown, the white markings rather larger, and the postdiscal rufous red and admarginal reddish rufous spots of the hindwing less red: postdiscal rufous red spots with a glaucous white lunule at proximal side.

Underside much more clayish than in ♂; silvery scaling beyond discal bars of forewing and in basal and abdominal region of hindwing heavier: the glaucous white proximal borders of the red postdiscal spots of the hindwing also heavier, and there is silvery scaling in submarginal interspace between SC^2 and R^2.

Length ♂ forewing,	costal margin	37	mm.,	internal margin	28	mm.
,, ,, hindwing,	,,	22	,,	,,	26	,,
,, ♀ forewing,	,,	43	,,	,,	31	,,
,, ,, hindwing,	,,	26	,,	,,	31	,,

Hab. Fiji Islands: Suva, Viti Levu, November 1894, wet season (Woodford): 5 ♂♂, 1 ♀. Hewitson gave as locality of this insect "Port Denison, Australia." Mr. Dämel, from whom Hewitson received the specimen, probably procured it from a South Sea skipper. The insect certainly does not occur in Australia; the *Eulepis* and *Charaxes* of the East are all split up into so well-marked geographical forms that the occurrence of the same species in Australia and Fiji, without it having developed into geographical races, appears to be incredible.

Variation.—The white markings vary very much in extent; one of our specimens has the discal band of the forewing above 7 mm. wide behind. The white discal scaling of the upperside of the hindwing has sometimes nearly disappeared, being indicated only by a few creamy scales near the end of the cell. The individuals (♂♂, ♀♀) which have the white discal band well developed below, and those in which it is very obscure or obsolete, occur during the same season, as Mr. Woodford obtained both forms at Suva, Viti Levu, in November, during the rainy season. The discal bar D^2—D^3 of the forewing below stands often just below the median bar D^1—D^2.

2. **Eulepis gamma** (Fig. 18. 18a, ♂).

Charaxes gamma Lathy, *Entom.* XXXI. p. 228 (1898) (New Caledonia ?).

♂. *Body* above olivaceous black, beneath grey, underside of palpi and anterior legs nearly cream-colour; head above with four creamy dots, last seven segments of antennae rufous brown.

Wings above brownish black.——Forewing: a discal and submarginal series of creamy white spots; discal spots SC^5—R^2 somewhat smaller than spot R^2—R^3, which stands close to cell, spot R^3—M^1 very small, the following two the largest; of the submarginal dots the first and third are minute.——Hindwing: a creamy white discal band from costal margin to R^3, nearly straight, barely 2½ mm. wide, its inner edge sinuate behind R^1, outer edge convex posteriorly; a series of three postdiscal uniform spots from R^3 to SM^2, consisting of rufous and cream-coloured scales; submarginal spots cream-colour, the first the largest, diameter about 2 mm.,

the spots M^1—SM^2 thin ; fringe cream-colour except at tips of veins ; no admarginal spots ; upper tail 4½ mm., second 2¼ mm.

Underside ecru-drab, with bands and patches in various brown shades.—— Forewing : middle bar of cell brown with black edge, apical bar almost straight,

Fig. 18.

Fig. 18a.

slightly indented in middle, apical interspace of cell vandyke-brown ; submedian bars M^1—(SM^1) continuous, forming one arched line which is continuous with upper cell-bar ; median bars M^1—SM^2 also continuous, bar (SM^1)—M^2 convex distally, bar M^1—M^2 curved distad at upper end, bar R^3—M^1 much more distal, bar R^2—R^3 close to cell but separated from bar D, series of bars SC^3—R^2 broken at R^1 ; white discal patches M^1—SC^2 wider than above, that at internal margin especially extended, white spot at discal side of bar R^3—M^1 thin, linear, the upper ones larger than above ; discal bars SC^1—R^2 well marked, interspace between them and discal white spots dark broccoli-brown, bar R^2—R^3 more proximal than median bar R^1—R^2, bar R^3—M^1 oblique, well marked, bordered creamy white distally, bars M^1—SM^2 placed in dark brown patches ; no postdiscal bars ; submarginal white dots not so well defined as above, but the posterior ones larger, followed by blackish brown, thin, transverse submarginal bars ; marginal area dark broccoli-brown, margin darker.——Hindwing : upper submedian bar fused with the respective median bar to form a ring, bar C—SC^1 thin, straight, cell-bar slightly thicker, bars M^2—SM^2 angled twice, continued to SM^3, which they reach about 4 mm. from base ; near base of cell there is a trace of the subbasal cell-bar, submedian interspace shining ecru-drab ; median series of bars as follows : bar C—SM^2 slightly convex distally, continuous with the next, bars R^1—R^3 a little more distal, bar R^3—M^1 still more distal, nearly at right angles to M^1, bar M^1—M^2 more proximal, oblique, bars M^2—SM^2 nearly 2 mm. distant at (SM^1) from discal lunule : bar D rather heavy ; median interspace drab-colour, shining ecru-drab before apex of cell ; discal white band not quite reaching R^3, shaded anteriorly with brown ; discal black bars rather thin, the first and three last luniform, all bordered white resp. bluish white distally, followed by postdiscal spots, of which the upper one and last three are red, the second and third pale broccoli-brown, first, third to fifth bordered black outwardly ; submarginal interspace pale broccoli-brown ; submarginal white dots as above, shaded with bluish grey scaling outwardly, black submarginal spots SC^2—R^3 thin, linear, the others forming small dots, all followed distally by admarginal pale ochraceous bars, margin broccoli-brown.

Length forewing, costal margin 30 mm., internal margin 21 mm.
„ hindwing, „ 18 „ „ 23 „

Hab. New Caledonia ; in the collections of Mr. H. J. Adams (1 ♂, *type*) and Mr. Ph. Crowley (1 ♂).

The individual in Mr. Ph. Crowley's collection is labelled "New Hebrides," but Mr. Lathy says, *l.c.*, that the two specimens, which came from Mr. W. Watkins, have afterwards been ascertained to be from "New Caledonia."

The New Hebrides are most likely inhabited by a species of *Eulepis* ; New Caledonia has already in *E. clitarchus* a representative of the genus.

b. Hindwing above without postdiscal spots.

*a*¹. Postdiscal red spots of hindwing below rounded or ovate, except spot M¹—SM².

3. **Eulepis epigenes** (Fig. 19 ♂. 20 ♀).

Charaxes epigenes Godman & Salvin, *Ann. Mag. N. H.* (6). I. p. 210 (1888) (Aola, Guadalcanar) : Smith & Kirby, *Rhop. Exot.* I. *Char.* t. 3. f. 1—4 (♂, ♀) (1888) ; Butl., *Journ. Linn. Soc. Lond.* XXV. p. 388. n. 109 (1895) ; Ribbe, *Iris* XI. p. 132 (1898) (Shortland Is.).

♂. *Body* olivaceous black above, with the usual white dots on head and pronotum; palpi with buff-coloured stripe beneath ; underside of thorax and abdomen, and legs, more or less russet.

Wings : upperside purplish black.——Forewing with two yellowish white discal spots between R³ and M², about 1 mm. in diameter, a third discal spot before R³

Fig. 19 ♂.

Fig. 20 ♀.

closer to cell, and two more between SC¹ and R² ; a series of submarginal spots, which stand farther from margin than in *E. pyrrhus*, 1 and 3 minute, 2 and 4 to 6 somewhat larger, elongate.——Hindwing without markings, except a complete series of pale blue submarginal spots of about the same size as in *E. pyrrhus jupiter* ; upper tail 7 to 8 mm., rather blunt, second as in *caphontis*, but more pointed.

Underside reddish chestnut.——Forewing : apical and marginal area more russet-chestnut ; bars rather thinner than in *pyrrhus jupiter* ; cell-bar 3 edged white

distally, bar 4 proximally, the two bars rather close together, not reaching M ; no submedian bars (always ?) ; median bars D^1—SM^2 curved, with white discal patches at their outer side, the submedian patch the largest (respectively 3 and 5 mm. wide), median bar D^2—D^3 about 1 mm. from cell and, like bars SC^4—D^2, with a white spot at outside; discal black bars uniform, the upper ones indistinct or absent, their position indicated by greyish scaling, bar D^2—D^3 just behind median bar D^1—D^2, as in many specimens of *cyphontis* ; submarginal spots not very clearly defined, being more or less shaded with rufous chestnut.——Hindwing : anal and abdominal region rather blackish ; submedian series of three bars, stopping at M, which it reaches before origin of M^2, bordered proximally with white; median series of bars slightly convex, bordered white distally; the white borders of median and submedian bars sharply defined and of about the same breadth as the bars; seven large rounded postdiscal spots, all rufous red edged proximally by bluish white thin lunules, and encircled by the discal and post-discal black bars, which are merged together to form rings ; submarginal black bars transverse, bluish white submarginal dots small, also more or less transverse ; admarginal rufous chestnut transverse spots slightly separated at veins, posterior ones with pale blue scaling at veins ; fringe white at internervular folds ; no black lines upon SM^2 and SM^3.

♀. *Body* similar to ♂, palpi beneath and breast more whitish.

Wings : upperside resembling that of *E. pyrrhus jupiter*.——Forewing with a series of white discal spots, as in *jupiter* and *cyphontis* : spots SC^5—R^2 ovate, about 2 mm. long ; spot R^2—R^3 close to cell, of about same size ; next spot rounded, diameter 3 mm., following three much larger, the last of them 8 mm. long : submarginal spots placed as in *cyphontis*, upper one generally absent, the following three small.——Hindwing : discal white band tapering to M^2, 7 to 8 mm. wide in front, with glaucous scaling at both sides down to (SM^1), no separate glaucous discal lunules ; submarginal spots pale glaucous, upper two more or less rounded, the others transverse : no admarginal spots. Tails as in ♂, somewhat broader.

Underside in various broccoli-brown shades.——Forewing : bars placed as in ♂ ; discal white patches and spots as above, but wider ; discal bars rather obscure ; upper submarginal white spots also ill-defined.——Hindwing : bars as in ♂, but white border of submedian bar wider, and border of median bars replaced by a broad white discal band, which gradually narrows down to M^2, and then forms a thin discal border to bars M^2—SM^3 ; the white band does not reach the discal black lunules ; admarginal transverse spots very obscure, more or less replaced by blackish and glaucous scaling.

Length ♂ forewing,		costal margin	37	mm.,	internal margin	25	mm.
,,	,, hindwing,	,,	21	,,	,,	25	,,
,,	♀ forewing,	,,	45	,,	,,	31	,,
,,	,, hindwing,	,,	28	,,	,,	30	,,

Hab. Solomon Islands : Guadalcanar (Woodford) : Shortland Islands (Ribbe) ; 1 ♀. In Mus. Brit., coll. Grose Smith, Ribbe.

Variation.—The dissimilarity of the sexes of this species is very remarkable, this being the only case of sexual dichromatism in *Eulepis* which is comparable to the great diversity in the pattern of the sexes of numerous species of *Charaxes*.

*b*¹. The red postdiscal spots of the underside of the hindwing more or less luniform: SM^2 and SM^3 of hindwing below black.

*a*². Median line of black bars of hindwing below somewhat convex between C^1 and M^1.

4. Eulepis clitarchus (Fig. 21, ♂).

Charaxes clitarchus Hewitson, *Ex. Butt.* V. *Charaxes* t. 4. f. 16. 17 (1874) (N. Caledonia); Kirby, *Cat. Diurn. Lep.* p. 748 (1877); Staud., *Exot. Schmett.* p. 173 (1886) (N. Caledonia); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 388 n. 107 (1895) (Lifu : N. Caledonia).

♂. *Body* above olive, abdomen with creamy scaling; underside of palpi, foretarsi, and forecoxae white or buffish white; sterna tawny ochraceous at sides, more

Fig. 21.

cream-colour in middle; abdomen creamy at sides, brownish black in middle; legs black, more or less scaled white at outside.

Wings above black.——Forewing: a broad discal band from internal margin to M^1, about 12 mm. wide posteriorly and 5 mm. at M^1, creamy white: fused with it is a large patch occupying the interspace between cell-bars 3 and 4; the basal area of wing, moreover, overshaded with creamy scaling which is less dense basally and costally; cellular patch concave distally; apex of cell nearly filled up by creamy scales, except a small spot at upper angle; outer edge of discal band indented at SM^3, then convex to M^1, preceded before M^1 by a small triangular creamy white spot, which often reaches R^5; very seldom a trace of median spot R^2—R^5 close to cell; upper median spots SC^5—R^1 almost pure white, concave proximally, very slightly separated from each other, preceded by one or two white lines; submarginal spots white, upper two triangular, third minute; submedian ones mostly obsolete, sometimes glaucous.——Hindwing: a discal creamy white band extends from costal margin to (SM^1) and hence curves round to abdominal margin, where it is dilated, it gradually narrows from SC^5 to (SM^1); the whole basal area and disc at outside of band covered with creamy scaling, but having a glaucous tint on account of the black colour showing through from the underside of the wing; a series of postdiscal pale glaucous lunules from C^1 to SM^2, the upper ones thin, joined to the creamy area or fused with it: the black postdiscal and submarginal patches resp. spots are fused,

forming a patch in which the pale glaucous blue submarginal transverse, more or less lunuform, spots are placed: patches R^1—M^2 gradually decrease in size, the posterior ones rounded; admarginal transverse spots concave at both sides, pale glaucous, the anal one yellow or olivaceous yellow, not wider than the others; abdominal fold greyish at edge of wing, with a black spot beyond tip of SM^2, corresponding to median bar SM^2—SM^3; fringe white except at tip of veins; tails pointed, upper one 6 mm. long, second 5 mm.

Underside: interspaces russet- and walnut-brown, in marginal region olive.—— Forewing: cell-bar 3 very heavy, 3 or 4 mm. broad behind, thinly bordered white proximally; cell-bar 4 curving from upper to lower angle of cell, much thinner, interspace white; discocellular bar thin; no submedian bars, or bar M^2—(SM^1) marked as a dot; median bar M^2—(SM^1) mostly present in form of a large dot, bars M^1—M^2 absent; white discal band as broad as above, nearly reaching to base of M^2; median bars R^4—M^1 continuous with each other (or nearly so), both bordered white distally; median bars SC^2—R^2 rather heavy, with broad white continuous patches at their distal side; discal black bars much better defined than in preceding species, posterior ones more or less straight, upper five lunuform, curved distad, bar R^2—R^3 much less proximal than in *caphontis* and *epigenes*; postdiscal bars russet-chestnut, except submedian ones, which are black and form together a mark similar to the number 3; interspaces between discal and postdiscal bars white, in submedian cellule glaucous owing to the black colour of the scales of the under layer; submarginal white dots well-marked, overshaded with silvery white scaling, which extends to the postdiscal bars and joins at the veins the white postdiscal interspaces, glaucous in submedian cellule.——Hindwing: basal region dark cinnamon-rufous, abdominal region paler; white discal band 10—11 mm. wide at costal edge of wing, narrowing to (SM^1) and curving round to abdominal margin, where it is dilated, 1½ mm. broad at M^2, not extended to black discal lunules: line of median bars, bordering the band proximally, convex, slightly broken at SC^2, of nearly even width, but bars (SM^1)—SM^3 wider; the submedian bars form a nearly straight line, curving distad at costal margin, reaching to M, but the broad white proximal border extending to near median bars M^2—SM^2; a black line upon SM^2 and SM^3 from near base to median bars, bordered white at both sides; discal bars thin, the bluish white lunules separating them from the postdiscal red spots heavier; these spots very different in shape from those of *epigenes*, resembling those of *pyrrhus*, the upper straight, linear, the following slightly lunuform, much paler than the others, the last three strongly lunuform, spots C—SC^2 and R^3—SM^2 bordered black externally, spots SC^2—R^3 bordered more or less white, the black postdiscal bars being here nearly absent; submarginal interspaces wood-brown; submarginal black spots heavy, more or less ovate, with the white submarginal spots as proximal ill-defined borders, which appear bluish where the whitish scales lie upon the black spots; admarginal interspaces occupied by yellow biconcave bars, with bluish scaling at the ends of the veins.

♀. Like the ♂, but larger.

Length ♂ forewing,	costal margin	42	mm.,	internal margin	30	mm.
„ „ hindwing,	„	26	„	„	29	„
„ ♀ forewing,	„	50	„	„	36	„
„ „ hindwing,	„	33	„	„	36	„

Hab. New Caledonia and Loyalty Islands: Lifu, 9 ♂♂, 1 ♀.

A peculiar, though not very conspicuous, feature of this insect is that the discal luniform bars of the underside of the forewing are curved distad, the horns of the lunules pointing basad, while in all other species of *Eulepis* they are curved in the opposite direction. We have not seen specimens from New Caledonia, but there is no doubt that the species occurs on the main island: the examples in British collections labelled New Caledonia are probably from the Loyalty Islands, which zoogeographically belong to New Caledonia.

*b*². Median line of bars of hindwing below somewhat concave, more or less parallel to submedian line.

5. **Eulepis pyrrhus** (Fig. 22—35).

Papilio Eques Achicus pyrrhus Linné, *Syst. Nat.* ed. X. p. 462. n. 24 (1758).
Charaxes (*Nymphalis*) *sempronius*, Koch, *Indo-Austr. Lep. Fauna* p. 50 (1865).

The Amboinese race of *pyrrhus* was the first form of all *Eulepis* and *Charaxes* made known to science.

♂ ♀. Head olivaceous isabella-colour or olive-black; four white dots above, a white line behind eye. Palpi creamy white, sometimes buffish, free portion of upperside black. Eyes deep chestnut. Thorax above varying from olive-black to white, with a white dot at each side on pronotum and another on patagium in front of wing; below white or yellowish white, with black stripes underneath the femora; anterior tibiae and inner side of femora and of two posterior pairs of tibiae black. Abdomen from olive-black to white above, white or more or less black beneath, its underside often different in the sexes.

Wings above black.——Forewing: a white or yellowish creamy band of variable width, often extended to base and, between M^2 and SM^2, to near outer margin, entire (or nearly so) between M^1 and internal margin, between M^1 and SC^5 broken up into four spots (which are seldom obsolete), spot R^2—R^3 close to apex of cell; a series of submarginal spots of same colour as band.——Hindwing: white discal band more or less triangular, with pale glaucous blue scaling at edges, or whole basal area scaled white; a series of submarginal dots white or pale glaucous blue; admarginal pale glaucous blue bars entire or interrupted. In fresh specimens the white markings are less yellowish than in worn ones, but in specimens killed too soon after the emergence from the chrysalis the postdiscal spots of the underside of the hindwing are paler than in individuals that have been at large.

Underside varies in the depth of the olive-yellow tints; forewing at inner angle often black or mouse-colour; hindwing in submarginal, often also in abdominal, region more or less drab-colour or mouse-grey.——Forewing: cell-bar 3 very heavy, bordered white distally and proximally; cell-bar 4 thinner than 3, generally joined upon subcostals to a discocellular bar, bordered white proximally; interspace between bars 3 and 4 often all white. Submedian and median bars M^1—SM^2 present or absent; median bar R^5—M^1 present, varying in position, often close to cell; preceding one always close to cell, often touching discocellular bar; median bars SC^4—R^2 about halfway between cell and discal bars: all median bars form the proximal border of white patches which correspond to those of upperside. Discal bars forming a continuous line, incurved between R^2 and M^2, bordered distally with milky white. Submarginal white spots as above, but shaded with milky

white.——Hindwing: no basal and subbasal bars; submedian bars forming a continuous, mostly slightly curved, line from costal margin to median nervure or beyond, the line crossing C close to PC, thinner behind, broadly bordered white proximally, this white scaling extending to (SM^1). Median bars forming a second line, parallel to the first, continuous (or nearly continuous) from costal margin to R^3, then interrupted, the last bar nearly at right angles to SM^2 continuous with bar (SM^1)—SM^2, the triangular space between it and last bar of discal series often whitish (also on upperside). White discal band at outside of median line of bars broadest in front, narrowing behind, varying in width and length. Discal bars continuous from costal margin to R^3, forming mostly an unbroken, evenly but slightly curved line; bars between R^3 and anal angle luniform; all the bars distally bordered white, the two last ones bordered pale blue; these white lines separate the discal bars from postdiscal heavy spots, of which the last three are always red, large, and half-moon-shaped, spot R^3—M^1 the largest, the preceding three red or yellow, smaller, the upper one more or less red, all bordered distally with the black postdiscal, more or less luniform, bars. Submarginal black spots proximally joined to white ones. Admarginal interspaces yellow; margin black; fringe white between veins. SM^2 (from base to last discal bar) and SM^3 black. Sometimes a vestigial bar at end of cell.

Outer margin of forewing concave, more so in ♂ than in ♀, slightly convex at the end of the veins. Hindwing with two tails, which are longer in ♀ than in ♂, the upper at R^3 the longer, the second at M^2 at least 3½ mm. long, all pointed except upper in ♀, which is blunt; outer edge dentate at end of veins.

The larva is known of the subspecies inhabiting Australia; it is green, and has on the segments bearing the first and third pair of abdominal legs a buff-coloured half-moon-shaped transverse band, which extends laterally to the anterior margin of the segment and ends on a level with the stigma; the band is broadest above, about half as wide as the segment is long, and is thinly edged with brown; the anterior part of the segment in front of the band is dark blue-green. All the abdominal segments have a longitudinal pale line below the stigma; these lines thinner on the thoracical segments and somewhat oblique. Head faintly striped. The chrysalis, which is known to us of *E. pyrrhus sempronius* and *jupiter*, is green, with the wing-cases parti-coloured with white. The larva and chrysalis of *keianus* (see 5*c*) are described by Kühn.

Hab. The range extends from Sumba, Sambawa, Kalao, over Timor, the Moluccas, to the Solomon Islands and New South Wales.

The geographical forms of *E. pyrrhus* are numerous and exhibit partly very conspicuous distinguishing characters. The species does not seem to be plentiful anywhere, though it is by no means a rarity. We know very little about its habits, and what is recorded under *sempronius* does not perhaps apply to all forms.

*a*³. Body above olivaceous black; abdomen white beneath in ♂, black or dark drab-colour in ♀. Basal area of both wings black above.

5*a*. E. pyrrhus jupiter (Fig. 22, ♂).

Charaxes jupiter Butler, *Lep. Exot.* I. p. 14. t. 5. f. 4. 7 (1869) (Dorey); Godm. & Salv., *P. Z. S.* p. 145. n. 20 (1877) (Duke of York); Staud., *Exot. Schmett.* p. 173 (1886) (Dorey: Waigeu);

Honr., *Sitz.-Ber. Berl. Ent. Zeit.* p. 16 (1887) (Neu Pommern) ; Smith, *Nov. Zool.* I. p. 357. n. 125 1894) (Humboldt Bay) ; Butl., *Journ. Linn. Soc. Lond.* XXV. p. 387. n. 103 (1895) (p. parte ; Pt. Moresby: Duke of York) ; Hagen, *Jahrb. Nass. Ver. Nat.* Vol. L p. 95. n. 162 (1897) (Germ. N. Guinea, December, January, April : Herbertshohe, Neu Pommern) : Ribbe, *Iris* XI. p. 131 (1898) (Neu Pommern).

Charaxes pyrrhus var. n. *kronos* Honrath, *Berl. Ent. Zeit.* XXXII. p. 250 (1888) (Ralum, Neu Pommern).

♂. Head and thorax above olive-black : abdomen paler, with a broad white median stripe beneath.

Wings, upperside.——Forewing with a bluish green gloss towards base: median band behind from 7 to 10 mm. wide, narrowing towards M^1 : patch M^1—M^2 seldom

Fig. 22.

separated, but always placed a little more distad than patch M^2—SM^2, especially its proximal edge ; spot R^3—M^1 more distal, smaller, rounded, measuring from 3 to 4½ mm.; spot R^2—R^3 close to cell, minute; upper median spots SC^5—R^2 somewhat larger than spot R^2—R^3, and little or not larger than submedian spot SC^5—R^1, the upper one rounded elongate, 1½ to 3 mm. long. Uppermost submarginal spot SC^4—SC^5 mostly absent, seldom vestigial, the following the largest, the third and the last the smallest ; little or no glaucous white scaling at the edges of the median band.—— Hindwing : white median band shaped as below, dilated basad about to origin of R^1 by means of pale glaucous white scaling, bordered distally with pale glaucous blue, especially heavily between R^3 and M^2, where the bluish scaling is sinuate, forming sometimes isolated lunules, often extended along M^2, seldom also along M^1, to join the admarginal spots of the same colour : a pale glaucous blue lunule also between M^2 and SM^2, separated from a whitish triangular patch at the end of the abdominal fold by a black line ; submarginal dots minute, the second the largest, pale glaucous blue with white centres ; pairs of triangular admarginal spots at end of veins R^2 to M^2 : between M^2 and SM^2 a complete admarginal yellow bar, the middle part of which is wider. Upper tail 6 to 9 mm., second 3½ to 7 mm. long.

Underside : marginal area of forewing and submarginal area of hindwing drab-colour, or mouse-grey, or clayish ochraceous ; submedian cellules of forewing more or less slate-colour, often nearly black distally ; rest of ground of wings in various shades of clayish ochraceous.——Forewing : middle bar of cell narrower than the interspace between it and the curved upper cell-bar, often constricted in middle, sometimes nearly divided into two spots, that interspace bordered white all round ;

discocellular bar mostly dilated at subcostals, edged white distally, sometimes nearly joined to the upper median bar, which is dilated basad, by means of some black dots standing between SC^5 and SC^5: submedian bars M^1—(SM^1) present, forming a short line that crosses M^2 at right angles about 2 mm. from cell; it is bordered white proximally, and does not reach (SM^1): median bar M^2—(SM^1) mostly close to the corresponding submedian one, often confluent with it, extended to (SM^1); median bar M^1—M^2 more distal, varying in position, its upper end at least 1½ mm. from origin of M^1; bar R^3—M^1 still more distal: bar R^2—R^3 about 1 to 1½ mm. from cell at R^2, but at R^3 sometimes touching discocellular bar; bar R^1—R^2 about 10 mm. from cell, curved, the preceding two placed a little more proximad; white patches resp. spots at outside of median bars as above, but those between SC^5 and M^1 larger, spot R^1—R^2 touching or nearly touching discal line, white scaling also at outside of bar SC^2—SC^4; submarginal spots luniform or bar-shaped, forming a continuous line from costal margin to SM^2, mostly joined along the veins to the white discal line.——Hindwing: submedian and median lines curved, the latter crossing M between M^1 and M^2; median band 5½ to 8 mm. wide anteriorly, reaching down to M^2, its outer edge evenly concave from costal margin to R^1, bordered by the black discal line; three red luniform discal spots, bordered distally by the black postdiscal lunules; discal spots SC^2—R^3 clayish ochraceous, slightly (seldom more heavily) tinged red, often very faintly marked; spot R^2—R^3 sometimes absent; spot C—SC^2 obliquely concave distally, broadest in front, yellowish red, but shading into clayish ochraceous behind; spots C—SC^2 and R^2—R^3 bordered black, SC^2—R^2 bordered white (or white and black) outwardly; submarginal black spots somewhat triangular, the posterior ones more or less rounded.

Upper cell-bar of forewing, submedian bars of fore- and hindwing outwardly, the median bars and discocellular bar proximally bordered plumbeous.

Length—

♂	forewing,	costal margin	45 mm.,	internal margin	31	mm.
	hindwing,	,,	27 ,,	,,	31½	,,
♀	forewing,	,,	36 ,,	,,	24½	,,
	hindwing,	,,	24 ,,	,,	25	,,

♀. Larger than ♂, tails relatively longer; median band of forewing wider, especially patch M^1—M^2; submarginal spots of both wings larger.

Hab. All over New Guinea and the neighbouring islands, and on the Bismarck Archipelago: Kapaur, Dutch New Guinea (W. Doherty, December 1896 to February 1897), 25 ♂♂; Humboldt Bay, Dutch New Guinea (W. Doherty, September to October 1892), 3 ♂♂; Dorey, Dutch New Guinea (W. Doherty, June 1897), 1 ♂; Ati-Ati-Onin, Dutch New Guinea, 1 ♂; Waigeu, 2 ♂♂; Erima, German New Guinea (Hagen, December and February), 3 ♂♂; Simbang, German New Guinea (Hagen, December), 2 ♀♀; Milne Bay, British New Guinea, 1 ♀; Port Moresby, British New Guinea, 3 ♂♂; Fergusson Island (A. S. Meek, September to December 1894), 2 ♂♂, 2 ♀♀; Kiriwini, Trobriand Islands (A. S. Meek, March to May 1894), 1 ♀; Herbertshöhe, Neu Pommern (Hagen, May 1894), 1 ♀; Kinigunang, Neu Pommern (Ribbe), 1 ♂; Neu Hannover (H. C. Webster, February and March 1897), 1 ♀. Aru Islands.

Variation.—The specimens from Dutch and German New Guinea do not seem to differ in either sex; in my single *female* from British New Guinea the pale

glaucous blue discal lunules of the upperside of the hindwing stand isolated, while in the *females* from other parts of New Guinea the lunules are merged together with the rest of the discal glaucous scaling.

Aru ♂♂ (♀♀ are unknown to us) agree with New Guinea specimens.

The individuals from New Britain (Neu Pommern) and Duke of York Island (Neu Lauenburg) have the submarginal dots of the upperside of the forewing rather often very small in ♂, especially the posterior ones, which are sometimes obliterated; the admarginal triangular pale glaucous blue spots are also mostly smaller than in ordinary New Guinea specimens; the discal lunules of the same colour are more often isolated; the discal spots of the hindwing below deeper red, the upper ones generally externally more obviously bordered black, and the submarginal black dots a little heavier. In ♀ the submarginal spots of the hindwing above are glaucous, without white centres. These slight differences do not hold good in all examples, not even in the larger proportion of the individuals which have been examined. The name of *kronos* must, therefore, be treated as a synonym of *jupiter*.

The only specimen (♀) known to us from Neu Hannover has the discal spots of the underside of the hindwing much more yellowish red than *jupiter*; the spots SC^2—R^1 are bordered black externally: the discal glaucous lunules of the upperside are rather heavy, but stand isolated.

In the tint of the discal yellowish red spots the Neu Hannover example agrees fairly well with the five specimens from the D'Entrecasteaux and Trobriand Islands, which are as large as the largest New Guinea individuals, have the discal glaucous lunules of the hindwing thin and isolated, and the white median patch R^3—M^1 of the underside of the hindwing standing farther away from the discal line than in ordinary *jupiter*. In one of the two Fergusson Island ♀♀ the median spot R^2—R^3 of the upperside of the forewing just touches the large median patch R^3—M^1. The ground-colour of the underside is in all five examples more yellowish than in New Guinea specimens.

5*b*. **E. pyrrhus attila** (Fig. 23, ♀).

Charaxes jupiter, Woodford, *Proc. Linn. Soc. N. S. Wales* p. 979 (1887) (Guadalcanar); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 387, sub n. 103 (1895) (*attila* = *jupiter*).

Charaxes attila Smith, *Ent. Mo. Ma.* XXV. p. 301 (1890) (Guadalcanar): id. & Kirby, *Rhop. Exot.* I. *Charaxes* t. 5. f. 1. 2 (1891).

Charaxes editha Ribbe, *Iris* XI. p. 131 (1898) (Bougainville).

♂. *Wings, upperside.*——Forewing: upper median spot SC^4—SC^5 small; median patch R^3—M^1 rounded, much smaller than in *jupiter*, diameter only 2½ mm.; the following one also rounded, diameters 2½ and 4½ mm. resp., separated from the patch M^2—SM^2.——Hindwing: discal pale glaucous blue scaling more extended distad than in *jupiter*; admarginal glaucous spots complete, expanding between the veins, not interrupted at the internervular folds, and anal one also glaucous, **not ochreous** as in *jupiter*; submarginal white spots small, the posterior ones linear. Abdominal fold with white scaling near base.

Underside.——Forewing: base and middle of cell white: median bar R^2—R^4 fused with discocellular one, white spot at outside of this bar larger than in *jupiter*; submarginal spots better marked, white scaling connecting them with one another and the white scaling at discal black line heavy, also so upon veins.——Hindwing: white border of submedian black line wider than in *jupiter*, abdominal region nearly all white: white median band much narrower from SM^2 to M^2 than in *jupiter*,

measuring between R^2 and R^1 barely 2 mm.; median as well as submedian line nearly straight, the latter crossing M at or near origin of M^1; three posterior discal brownish red luniform spots narrower than in *jupiter*, more heavily bordered black, the spots C^1—R^1 dirty ochraceous, tinged red, their white proximal border heavy, shining through above when the insect is placed between light and eye; black submarginal spots linear; cellule SC^2—R^1 more or less silvery in submarginal region; admarginal band of greenish ochraceous bars narrower than in *jupiter*.

♀. Similar to ♂. Submarginal and upper four median spots of forewing above larger, median patch R^2—R^3 subquadrate, the following also larger than in ♂, but separated from patch M^2—SM^2. Submarginal dot SC^1—SC^2 present, but very small.——Hindwing: pale glaucous blue scaling not more extended than in *jupiter* ♀, discal pale glaucous blue lunules separate; submarginal spots larger than in *jupiter*, the upper one rounded, the others linear, those between M^1 and SM^2 pale glaucous blue, long, the submedian ones nearly forming one line of 7 mm. length;

Fig. 23.

admarginal spots complete as in ♂, spot R^3—M^1 prolonged along R^3 to near tip of tail.

Underside: silvery white scaling much extended on both wings.——Forewing: median patch R^3—M^1 extended to discal line; submedian bars M^1—(SM^1) nearly obliterated.——Hindwing: median band not reaching M^1, portion beyond R^5 very thin; discal spots very pale reddish yellow, the last divided, much shaded with black.

Hab. Solomon Islands: Gnadalcanar (Woodford), in coll. Grose Smith (*type* ♂, ♀) and in British Museum (2 ♀♀); Bougainville (1 ♀ in coll. Ribbe).

This form is especially interesting for the complete admarginal spots of the hindwing above, the last one of which is concolorous with the others, not ochraceous, and for the postdiscal spots M^2—SM^2 of the underside being more or less completely separated from each other, not being fused to form one lunule.

Mr. Ribbe compares his new species *editha* with *jupiter* instead of *attila*, which he does not mention.

5c. E. pyrrhus keianus (Pl. VI. f. 2, ♀).

Charaxes pyrrhus keianus Rothschild, Nov. Zool., IV. p. 508. n. 2 (1897) (Kei Toeal ; Great Kei).
Charaxes keianus, Nicéville & Kühn, *Journ. As. Soc. Beng.* LXVII. II. p. 262. n. 42 (1898) (Kei Is., larva, pupa).*

♂. *Wings, upperside.*——Forewing: discal band less narrowing in front: patch R^3—M^1 larger than in *jupiter*, extending basad as far or nearly as far as patch M^1—M^2, not or scarcely separated from the patch behind it and touching spot R^2—R^3, which is much larger than in *jupiter*, being about 3 mm. long. Median spots SC^4—R^2 larger than in *jupiter* : submarginal spots as in that subspecies, upper one, SC^4—SC^5, seldom vestigial.——Hindwing : discal band slender, inner edge nearly straight, slightly sinuate between SC^2—R^1, where there appears a spot which is slightly darker than the rest of the brownish black basal area : at inner edge of band there is glaucous white scaling only in cell and behind, while the band is more heavily bordered pale glaucous blue outwardly up to SC^2; discal lunules of this colour more or less isolated, often nearly absent, except the anal one ; submarginal spots little heavier than in *jupiter*, admarginal spots as in that form, but anal yellow mark smaller.

Underside.——Forewing: upper cell-bar less evenly curved than in *jupiter*, being straight in middle or even slightly bent distad ; discocellular bar not or slightly dilated distad upon subcostals ; submedian bar M^1—M^2 close to origin of M^2, sometimes absent, being then indicated only by the white scaling standing at the proximal side of this bar: submedian bar M^2—(SM^1) absent ; median bars R^2—(SM^1) closer to cell than in *jupiter* ; bar R^2—R^3 continuous with bar R^3—M^1, merged together with the discocellular bar, but anteriorly separated from it by a thin whitish plumbeous line; median patch R^3—M^1 much more widely separate from discal line than in *jupiter*.——Hindwing : submedian and median lines straighter than in *jupiter*, the median one slightly broken at SC^2, bar SC^2—R^1 being more distal than bar C^1—SC^2 ; median band straighter outwardly, the discal line bordering it being less curved ; discal spots as in *jupiter*, but upper one wider anteriorly, black outer border of posterior ones sometimes very thin ; black lines upon SM^2 and SM^3 very thin ; oblique abdominal bar also thinner than in *jupiter*.

♀. Differs from *jupiter* like ♂. Upper discal patches of forewing still larger : pale glaucous blue lunules of hindwing above well isolated. Two of our three ♀♀ with the upper submarginal dot of forewing present above.

Hab. Kei Toeal (Capt. H. C. Webster, January to March 1896), 2 ♂♂, 3 ♀♀ : Great Kei (Capt. H. C. Webster, April 1896), 2 ♂♂.

* Mr. de Nicéville, *l.c.*, says : "This species is described by de Nicéville in *Journ. Bomb. Nat. Hist. Soc.*, Vol. XII., p. , n. 8, pl. Z, figs. 13, *male*; 14, *female* (1898). When describing it de Nicéville did not know that it would subsequently be named by the Hon. Walter Rothschild."

My description appeared in December 1897 ; de Nicéville cites my description, while in 1898 he did not yet know the number of the page on which his description in *Journ. Bomb. Nat. Hist. Soc.* will appear, nor have I received, up to December 1898, the number of the Journal which contains de Nicéville's description.

Kühn, who has bred the larva, says (*l.c.*) that it "feeds on Albizzia sp., and also on Mesua ferrea (Ironwood). The pupa is of the usual shape, very broad, rounded, smooth, with some small knobs only round the cremaster. In colour it is pale green, with snow-white stripes and dashes."

b^3. Thorax above olivaceous black or white ; abdomen in both sexes to the greater extent white. White resp. glaucous white scaling of upperside of wings extended to base.

5*d*. E. pyrrhus pyrrhus (Fig. 24, ♂).

Seba, *Thesaurus* IV. p. 57. t. 47. f. 1. 2. (1765) (" America ").

Papilio Eques Achivus pyrrhus Linné, *Syst. Nat.* ed. X. p. 462. n. 24 (1758) (in Indiis) ; Clerck, *Icon. Ins.* II. t. 25. f. 2 (1764) ; Linné, *Mus. Lud. Ulr.* p. 205. n. 24 (1764) (in Indiis) ; id., *Syst Nat.* ed. XII. p. 749. n. 25 (1767) ; Houtt., *Naturl. Hist.* I. 11. p. 203. n. 24 (1767) : Fabr., *Syst. Ent.* p. 449. n. 30 (1775) (p. parte) : Cram., *Pap. Ex.* III. p. 45. t. 220. f. A. B (1779) (Amboina) : Goeze, *Ent. Beytr.* III. 1. p. 50. n. 25 (1779) ; Fabr., *Spec. Ins.* p. 10. n. 41 (1781) (p. parte) ; id., *Mant. Ins.* II. p. 6. n. 45 (1787) (p. parte) ; Gmel., *Syst. Nat.* I. 5. p. 2234. n. 25 (1790) (p. parte) ; Herbst, *Naturs. Schmett.* IV. p. 53. n. 149. t. 62. f. 1. 2 (1790) (Amboina) : Thunberg, *Mus. Nat. Ups.* XXIII. p. 9 (1804).

Papilio (*Achivus*) *pyrrhus*, Müller, *Naturs.* V. 1. p. 573. n. 25 (1774) (India).

Papilio Nymphalis pyrrhus, Fabricius, *Ent. Syst.* III. 1. p. 61. n. 192 (1793) (p. parte).

Papilio Eques Achivus canomaculatus Goeze, *Ent. Beytr.* III. 1. p. 88. n. 77 (1779).

Eriboea pyrrichia Hübner, *Verz. bek. Schm.* p. 47. n. 433 (1816).

Nymphalis pyrrhus, Godart, *Enc. Méth.* IX. p. 356. n. 22 (1823) (Amboina) : Lucas, *Lép. Exot.* p. 121 (1835) (Amboina) ; Doubl. & Westw., *Gen. Diurn. Lep.* II. p. 309. n. 24 (1850) (Amboina) ; Kirby, *Cat. Diurn. Lep.* p. 270. n. 36 (1875) ; Pagenst., *Jahrb. Nass. Ver. Nat.* XXXVII. p. 187 (1884) (Amboina) : Wallace, *Nat. Sel. and Tropical Nat.* p. 385 note (1891).

Nymphalis pyrrus, Lucas, *l.c.* t. 65. f. 2 (1835).

Charaxes (*Nymphalis*) *sempronius*, Koch, *Indo-Austr. Lep. Faunu* p. 50 (1865) (*pyrrhus* Cram. ex Amboina = *sempronius* F. ex Australia = *tyrtaeus* Feld.).

Charaxes pyrrhus, Butler, *P. Z. S.* p. 132. n. 39 (1865) (Amboina) ; id., *Cat. Diurn. Lep. descr. Fabr.* p. 51. n. 5 (1869) : Auriv., *K. Sv. Vet. Akad. Handl.* XIX. 5. p. 26. n. 24 (1882) ; Staud., *Exot. Schmett.* p. 173 (1886) (Amboina) ; Ribbe, *Iris* II. p. 240. n. 79 (1890) (Ceram) : Butl., *Journ. Linn. Soc. Lond.* XXV. p. 387. n. 102 (1895) (Amboina) : Oberth., *Et. d'Ent.* XX. p. xiii. fig. (1896) (Ceram).

♂. Larger than *jupiter*. Head and thorax above olivaceous black, mesothorax behind greyish, metathorax white at sides, grey in middle ; abdomen white above and below.

Wings, upperside.——Forewing : basal area behind cell up to discal band glaucous white, a few glaucous scales in front of M in cell, sometimes scarcely any such scales between M and M^2 : median band about 8 mm. wide at (SM^1), 3 to 4 mm. behind M^1 ; patch M^1—M^2 extending as far basad as patch M^1—SM^2, hence inner edge of band nearly straight as in *keianus* ; M^2 black ; patch R^3—M^1 mostly rounded, isolated, varying in width from 3½ to 6 mm., placed less distal than in *jupiter*, standing mostly rather close to spot R^2—R^3, which is larger than in *jupiter*, sometimes only one-third smaller than patch R^3—M^2 ; median spots SC^5—R^2 nearly always somewhat smaller than spot R^2—R^3, 1 to 2½ mm. long, the upper the smaller, often obsolete ; submarginal spots larger than in *jupiter*, spot SC^4—SC^5 mostly absent, sometimes vestigial, less often as large as spot R^1—R^2, spot SC^5—R^1 about 2½ mm. long, spots M^1—SM^2 well marked.——Hindwing : the whole basal area glaucous white ; median band bordered proximally by a black line from C to R^1, or from C to SC^2 ; median band narrow, varying in length, sometimes stopping at R^2, in other specimens extended beyond M^1 ; greyish glaucous blue discal lunules from SC^2 to abdominal margin well marked, partly isolated ; submarginal white dots larger than in *jupiter*, shaded with glaucous blue, the upper two of about the same size, diameter 1½ to 2 mm. ; admarginal greyish glaucous blue internervular spots

not interrupted between veins, seldom centred white, anal one cadmium-yellow; abdominal fold brown distally or nearly all dirty white, terminated by a whitish triangular spot.

Underside: black bars and lines very heavy, at least twice as thick as in *jupiter*; ground-colour more or less tawny olive, forewing mostly more yellowish, much less silvery and mouse-colour than in *jupiter*.——Forewing: middle cell-bar 2½ to 4 mm. wide, generally dilated at both ends, about as wide as the interspace between it and subapical bar; this latter fused with the discocellular bar, only separated from it in middle by a narrow interspace, which is often represented by a thin white line; base of cell tawny olive, postmedian interspace of cell white with centre more or less yellowish tawny olive; two submedian bars M^1—(SM^1), close to cell, thinly bordered white proximally, more or less completely fused with the resp. median bars; median bar R^3—M^1 more distal, often filling up the angle R^3—M^1, bar R^2—R^3 fused with discocellular one; white median patch R^3—M^1 at M 2 to 3 mm. distant from heavy discal line; white border of discal line, appearing posteriorly bluish, as

Fig. 24.

well as submarginal spots variable in width, often so heavy that the interspaces have the shape of rather thin lunules.——Hindwing: black lines from 1 to 1½ mm. wide; white border of submedian line not broader than this line, often thinner; median line sometimes joining submedian one at costal margin; white discal band triangular, 6 to 10 mm. broad at costal margin, strongly narrowing behind, barely 1 mm. wide between R^2 and R^3, often stopping at R^3, sometimes extending beyond M^2, its inner edge straight or incurved at C, outer edge concave, not well marked on account of tawny olive scaling that separates the band from the black discal, strongly arched, line; three posterior discal spots mostly somewhat deeper red than in *jupiter*; spots C—SC^2 and R^2—R^3 also reddish, the latter sometimes rather more ochraceous; spots SC^2—R^2 ochraceous, bordered white or white and black outwardly; spots C—SC^2 with heavy black border, anteriorly little wider than posteriorly; black submarginal spots transverse, nearly as large as the admarginal ochraceous ones; abdominal median bar more oblique than in *jupiter*, usually widened upon SM^2, sometimes connected with the last black discal lunule and mostly joining the line SM^3.

♀. Head and thorax as in ♂; abdomen beneath with a broad black middle

stripe. Wings as in ♂, but the white markings of upperside of forewing larger; discal patch R^3—M^1 rather often extended to cell, discal spots SC^4—R^1 over 6 mm. long in one of my Amboina ♀♀; submarginal spot SC^4—SC^5 present, but small. On underside the black patch formed by submedian and median bars M^2—(SM^1) often small on account of the large development of the white colour.

Length ♂ forewing,	costal margin	49	mm.,	internal margin	33	mm.
„ „ hindwing,	„	27	„	„	33	„
„ ♀ forewing,	„	58	„	„	40	„
„ „ hindwing,	„	35	„	„	37	„

Hab. Amboina (W. Doherty, February 1892), 10 ♂♂, 4 ♀♀; Ceram.

5*e*. **E. pyrrhus bandanus** Rothsch., subsp. nov. (Fig. 25, ♀).

♀. Similar to *pyrrhus pyrrhus*; but forewing above with discal band wider; patch M^1—M^2 extended to cell, 14 mm. long at M^2; patch R^3—M^1 longer than in

Fig. 25.

pyrrhus pyrrhus, reaching cell, 10 mm. long at M^1; greater part of cell shaded with buffish white scales, which form a distinct patch at lower angle of cell; upper submarginal spot well marked, more than half the size of the third spot R^2—R^3.—— Hindwing: submarginal spots small, the anterior ones not half the size of those of *pyrrhus pyrrhus*, the posterior ones minute, greyish glaucous blue.

Underside: black bars and lines not so heavy as in *pyrrhus pyrrhus*.——Forewing: middle cell-bar about half the width of the nearly all white subapical interspace; apical cell-bar not so wide as the interspace separating it from bar D, to which it is joined at both ends; submarginal spots closer to edge of wing.—— Hindwing: white discal band wider between SC^4 and M^2, extending down to M^3; submarginal white spots small, the black ones also smaller than in *pyrrhus*; the admarginal ochraceous spots heavier and deeper in tint, marginal line thinner; black lines upon SM^2 and SM^3 thin; median bars (SM^1)—SM^3 forming a blunt angle, wider apart from last discal lunule than in *pyrrhus*.

Hab. Banda Islands (W. Doherty), 1 ♀.

5*f*. **E. pyrrhus buruanus** Rothsch., subsp. nov. (Fig. 26, ♂).

♂. Smaller than *pyrrhus*, resembling *gilolensis*. Body as in *pyrrhus pyrrhus*. *Wings, upperside.*——Forewing : posterior half of cell shaded with glaucous white scales, which are denser before apex : white discal band very wide, only 6 mm. distant from outer edge of wing at SM^2; the interspace between band and cell resp. base of wing densely scaled glaucous white, band at M^2 4 mm. from cell, veins M^2 and SM^2 not black within band : patch R^3—M^1 isolated, rounded proximally, diameter about 3½ mm., patch R^2—R^3 a little smaller ; median spots SC^5—R^2 of nearly equal size, the upper more elongate (3 mm. long) : submarginal

Fig. 26.

dots considerably smaller than in *pyrrhus pyrrhus*, spot SC^1—SC^5 present, posterior ones shaded with glaucous.——Hindwing : white discal band thin, reaching beyond M, which it crosses at origin of M^1; glaucous white scaling dense, covering the greater part of the wing ; outer edge of this area concave between veins, the discal lunules of the preceding subspecies here not being separated; black outer area widest at SC^2 (13 mm.), strongly narrowing behind, where it is convex between the veins both proximally and distally ; glaucous discal scaling extending a little along M^1 and M^2, but not joining the admarginal spots, which are thinner in middle than in the two preceding races ; submarginal dots glaucous with white centres, smaller than in *pyrrhus*.

Underside : all the bars and lines, except middle bar of cell of forewing, thinner than in *pyrrhus pyrrhus*.——Forewing : middle cell-bar as broad as in *pyrrhus*, the interspace following it narrow, encircled with white ; subapical bar thinner, posteriorly not joined to discocellular bar, which is thin and anteriorly not dilated distad ; apical interspace of cell ochraceous, wider than subapical bar; submedian bars M^1—(SM^1) very short, close to cell ; median bars M^1—(SM^1) close to submedian ones, the upper touching M with upper end ; median bar R^4—M^1 2 mm. from lower angle of cell at R^3, bar R^2—R^3 merged together with discocellular bar, three upper median bars prolonged basad along veins ; white discal band coming close to discal line at (SM^1) ; greyish silvery border of discal line rather thin ; submarginal spots small with little silvery scaling round them, the last two nearly obliterated. ——Hindwing : white discal band narrow, but extending down to M^1, about 7 mm. in front, gradually tapering behind, distally concave to R^3, separated from thin discal black line by a narrow olivaceous interspace except at costal margin ; discal spots

all red, but spot R^2—R^3 replaced by black and white scales intermixed with very few red ones, elongate; spots SC^2—R^2 and R^3—M^1 more rounded than in preceding races, rather heavily bordered black distally; submarginal white dots small, black ones also much smaller than in *pyrrhus pyrrhus*; median bars (SM^1)—SM^3 heavy, oblique, not joining the line SM^3, at (SM^1) 2 mm. distant from anal lunule of discal series; lines SM^2 and SM^3 thin.

Length forewing, costal margin 41 mm., internal margin 29 mm.
„ hindwing, „ 25 „ „ 29 „

Hab. Buru: North Coast (W. Doherty, November 1897), 2 ♂♂.

5g. **E. pyrrhus obiensis** Rothsch., subsp. nov. (Fig. 27, ♂).

♂. Somewhat larger than *buruanus*. Abdomen grey above.

Wings, upperside.——Forewing: discal patch R^3—M^1 at least half as large again as spot R^2—R^3: glaucous white cellular scaling not denser near apex of cell

Fig. 27.

(in one individual altogether wanting); submarginal spot SC^4—SC^5 vestigial or absent.——Hindwing: submarginal spots without obvious white centres; admarginal spots partly interrupted at internervular folds, or nearly so; discal glaucous white scaling as in *buruanus*, in one specimen extended along M^1 and M^2, joining the admarginal spots; white median band narrow, stopping at SC^2.

Underside: bars and lines heavier than in *buruanus*, except discal line.——Forewing: median bars SC^2—R^2 very heavy, much extended basad, sometimes nearly reaching upper end of discocellular bar; discal bars somewhat lunuform, wider distant from distal margin of wing than in preceding subspecies, hence interspace between discal line and submarginal small spots wider than usually; discal line thinly bordered silvery grey, bar M^1—M^2 with a very thin, M^2—SM^2 mostly without silvery border; silvery scaling at outer side of submarginal spots forming between M^1 and SM^2 a spot close to margin of wing.——Hindwing: white median band very short, stopping at SC^2, or continued to R^3 as a very thin white or glaucous line, much shaded with ochreous in front, then with olive, being white only at edge

of median black line, more than 6 to 10 mm. wide at costal edge of wing; submedian and median lines joining each other in front, except in one individual; discal line strongly incurved from C to R^3, behind R^2 only 1 mm. distant from median line, in one example confluent with that line from R^1 to R^3; discal spots all red; spot R^2—R^3 also red, long, more or less encircled white; spots C—M^1 with heavy black triangular patches at outside; abdominal median bars (SM^1)—SM^3 heavy, somewhat flexuose, mostly touching or almost touching anal lunule of discal series at (SM^1); median bar M^2—(SM^1) present, but mostly very short; lines upon SM^2 and SM^3 thinner towards their end than in *pyrrhus pyrrhus*, but heavier at base than in *buruanus*; submarginal white dots smaller than in *buruanus*; submarginal area slate-colour.

Hab. Laiwui, Island of Obi (W. Doherty, September 1897), 5 ♂♂.

5*b*. E. pyrrhus gilolensis (Fig. 28, ♂).

Charaxes gilolensis Butler, *Lep. Exot.* I. p. 14. t. 5. f. 6. t. 6. f. 3 (1869) (Batjan; Gilolo); Kirby, *Cat. Diurn. Lep.* p. 271. n. 37 (1875) (Gilolo; Batjan); Oberth., *Ann. Mus. Civ. Genova* XV. p. 504 (1879) (Halmaheira); Staud., *Exot. Schmett.* p. 173 (1886) (Batjan); Ribbe, *Iris* I. p. 205. n. 76 (1887) (Batjan); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 387. n. 105 (1895) (Batjan, *typ.*).

Charaxes pyrrhus var. *gilolensis*, Pagenstecher, *Jahrb. Nass. Ver. Nat.* XXXVII. p. 187 (1884).

♂. Differs from *obiensis* especially in the black area of the upperside of the hindwing being narrower, in the white discal band of the underside being much

Fig. 28.

longer, extending to R^1 or nearly to M^2, being much purer white, with the outer edge better defined, in the discal black line standing farther away from median line behind R^2, and in the admarginal spots of upper- and underside being heavier, less constricted in middle.

Upperside.——Forewing: glaucous white scaling in cell seldom denser near origin of M^1: median patch R^3—M^1 varying considerably in size, diameter 2½ to 5 mm., sometimes smaller than spot R^2—R^3, distance between these spots ½ to 3 mm. in different individuals; first submarginal dot vestigial or nearly as large as spot R^1—R^2, rarely absent.——Glaucous white area of hindwing extending along M^1 and M^2, mostly joining the admarginal spots, isolating completely two rounded, ellipsoid,

black patches, which include the submarginal spots; patch M^1—M 4 mm. wide or less, patch M^2—SM^2 narrower.

Underside.——Forewing: upper cell-bar either straight (or nearly so), then posteriorly not joined to discocellular bar, and apical interspace triangular, posteriorly wider than bar, or subapical bar heavier, somewhat curved, joined to discocellular bar at both ends, with a thin linear apical interspace: submedian and resp. median bars merged together or free; median bar R^3—M^1 sometimes a heavy patch; patch-like bar R^1—R^2 either well separated from discalone, or touching it; submarginal spots and white scaling varying in extent, sometimes with thin black lines at the outside: inner angle (as in *obiensis*) with an indistinct whitish spot outside the submarginal spot, corresponding to the admarginal spots of hindwing.——Hindwing: submedian and median lines straight at costal margin, or (mostly) curving towards each other, sometimes joined together, varying in thickness; median band 7 to 9 mm. wide at edge of wing, 1½ to 2 mm. at R^1, not shaded over with ochraceous and olive scaling; upper discal red spot thinner bordered black distally than the following two; median bar M^2—(SM^1) present.

♀. *Upperside.*——Forewing: median patch R^3—M^1 extended to cell (Halmaheira), or nearly to cell (Batjan); white area nearly reaching submarginal spots between M^1—SM^2; median spots SC^2—R^3 larger than in ♂, spot R^2—R^3 close to that behind it; posterior three-fifths of cell white.

Underside: discal red spots of hindwing smaller than in ♂, paler red.

Hab. Northern Moluccas: Batjan, 3 ♂♂: Halmaheira (W. Doherty, August 1892), 1 ♂; *females* in coll. Staudinger.

5*i*. **E. pyrrhus seitzi** (Pl. V. f. 1, ♀).

Charaxes pyrrhus seitzi Rothschild, Nov. Zool. IV. p. 508. n. 3 (1897) (Tenimber Is.).

♂. Head, pronotum, and anterior portion of mesonotum olive-brown; rest of mesonotum, metanotum, and abdomen white.

Wings, upperside.—— Forewing: cell with white scaling, condensed to a patch beyond middle, apex and upper angle black; median band more proximal than in the preceding forms of *pyrrhus*, its inner edge crossing M just a little beyond origin of M^2, outer edge incised upon M^2, 14 mm. from edge of wing at SM^2; discal spot R^3—M^1 indicated by a few scales, spot R^2—R^3 obliterated, seldom a few white scales left, spots SC^5—R^2 also absent or only vestigial; first and third submarginal dots vestigial, second elongate, last two absent or indicated by a few glaucous scales: abdominal fold greyish brown at end, terminated by a greyish white patch.—— Hindwing: glaucous white scaling extending from base nearly to bend of R^5, posteriorly more restricted than in preceding races, its outer edge only 3 to 5 mm. from origin of M^1; discal whitish glaucous luniform spots between R^5 and M^2 widely separated from the basi-discal area, sometimes obsolete; discal band reaching to R^3, a little wider than in *gilolensis*; submarginal glaucous spots minute; admarginal spots from SC^2 to anal angle, constricted in middle, the upper ones interrupted.

Underside dark tawny olive, with a peculiar chocolate hue.——Forewing: post-median cellular interspace white, with few ochraceous scales; cell-bar 4 thinner than in *gilolensis*, posteriorly not joined to the thin bar D, apical cellular interspace twice as wide as bar 4; submedian and median bars M^1—(SM^1) absent, discal patch M^1—M^2 filling base of cellule M^1—M^2, bar R^1—M^1 arched, close to cell, bar R^5—R^3 fused

with bar D at both ends, with a thin tawny ochraceous line between, bar R^1—R^2 arched, the preceding two coniform: white discal patches R^3—M^1 luniform; discal line of bars rather heavy: submarginal spots somewhat thinner than in *gilolensis*; marginal area from inner margin to beyond M^2 purplish black, hence discal bar M^2—SM^2 obscure.——Hindwing: submedian and median lines curved towards each other, or joining each other, at costal margin, median line broken beyond R^1, crossing M beyond origin of M^1; white median band 5 to 6 mm. wide in front, gradually narrowing behind, stopping at R^3, pure white, its outer edge slightly concave, separated from discal black line by an interspace of nearly equal width throughout (2 mm.); discal spots deep red, except spots SC^2—R^2, which are more rufous, upper one trapeziform as in *buruanus*, black outer border of these spots thin: submarginal white dots thin, anterior ones nearly obliterated, black spots as in *gilolensis*, not touching veins; ochreous admarginal spots heavy, with pale glaucous blue triangular spots at ends of veins; lines upon SM^2 and SM^3 thin.

♀. Coloured like ♂, but first submarginal spot of forewing above larger than the third; white area of hindwing a little more restricted than in ♂; discal pale glaucous blue spots more or less obsolete, submarginal spots somewhat larger, but posterior ones only vestigial. On *underside* white band of hindwing very little extending beyond R^2; external black border of discal spots sometimes rather heavy (see figure); submarginal white spots larger, but much shaded with glaucous.

Hab. Tenimber Islands: Selaru (W. Doherty, March 1897), 2 ♂♂, 1 ♀: Sjerra (W. Doherty, June—July 1892), 2 ♀♀.

5*k*. E. pyrrhus galaxia (Fig. 29, ♂).

Charaxes galaxia Butler, *P. Z. S.* p. 633. n. 10. t. 37. f. 2 (1865) (Timor); id., *l.c.* p. 457 (1866); Staud., *Exot. Schmett.* p. 173 (1886) (Timor): Smith & Kirby, *Rhop. Exot.* I. *Char.* t. 9. f. 3. 4 (1891) (Timor); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 387. n. 104 (1895) (Timor).
Nymphalis pyrrhus var. a. *Char. galaxia*, Kirby, *Cat. Diurn. Lep.* p. 270 (1875).

♂. Body as in *pyrrhus pyrrhus*, but head and pronotum more greyish, rest of notum purer white.

Wings, *upperside*.——Forewing: white basal area (inclusive of discal band) a little more extended distad than in *seitzi*, filling the cell except apex and occupying base of costal margin, and often covering also the base of cellule R^1—M^1; median spot R^2—M^1 rounded or transverse, diameter 2 to 3 mm., isolated, spot R^2—R^3 smaller, often about half the size, the two close together or about 1 mm. distant from each other, median spots SC^5—R^2 always present, the upper one the larger (2 mm. wide); submarginal spots heavy, the third the smallest, the first about as large as the second (2 mm.), rarely much smaller, the two last sometimes vestigial.——Hindwing: glaucous white area reaching to discal pale glaucous blue lunules, which are either fused with that area or are slightly separated; submarginal spots smaller than those of forewing, the fifth often vestigial, the last two linear, forming mostly a thin curved line, posterior ones more glaucous, anterior ones more white; admarginal spots from R^1 to SM^2, constricted in middle or interrupted, seldom a spot before R^1, those at R^3 and M^2 extending into tails; abdominal fold white, slightly brownish towards end.

Underside tawny olive, region of inner angle of forewing blackish, submarginal area of hindwing olive.——Forewing as in *seitzi*; cell-bar 3 sinuate at distal side: discal patch M^2—SM^2 wider than in *seitzi*; discal line obvious between M^1 and

SM^2, bordered white ; submarginal spots large, the last two forming a conspicuous incised spot.——Hindwing: submedian and median lines nearly as in *seitzi*, median one always crossing M beyond origin of M^1, interrupted at R^3 and M^1, abdominal bars (SM^1)—SM^3 angulate upon SM^2, lines SM^2 and SM^3 thin ; white discal band 8 to 10 mm. wide at costal margin, but only 2 to 3 mm. broad at C, very irregular, mostly stopping at R^1, seldom extending to R^2, or forming beyond R^2 only a very thin glaucous white border to the median bars; interspace between discal band and discal black line about 5 mm. between the veins ; bar C—SC^2 of discal series more arched than the following three, all rather thin, the last three not touching each other ; three posterior discal spots red, spots C—SC^2 and R^2—R^3 more or less red, often

Fig. 29.

yellowish, spots SC^2—R^2 ochreous, somewhat tinged with red; submarginal white spots ill-defined, shaded with glaucous, black one transverse, heavier, not touching veins. A thin discocellular bar very often indicated.

♀. Pronotum and anterior portion of mesonotum more white than in ♂. Agrees in pattern with ♂ : submarginal spots (as usually) rather larger, especially the first of the forewing above.

Hab. Timor : Dili (W. Doherty, May 1892), 12 ♂♂, 1 ♀ ; Wetter (W. Doherty, May 1892), 5 ♂♂.

In the specimens from Wetter the submarginal spots of the hindwing above are sometimes smaller and less white than in Timor individuals : the median band of the hindwing below extends in one example to R^1, in some others the median line of bars is less interrupted at R^1 and M^1.

bl. **E. pyrrhus lettianus** Rothsch., subsp. nov. (Fig. 30, ♀).

♀. *Wings, upperside.*——Forewing: white area more expanded than in *galaxia* ♀, patch M^1—M^2 about 20 mm. wide at M^2 and 6 mm. at M^1, patch R^3—M^1 touching those before and behind it, subtrapeziform, somewhat concave proximally, diameter about 5 mm., spot R^2—R^3 half the size, discal spot SC^4—SC^5 much larger than in *galaxia*, over 4 mm. long ; submarginal spots also larger, first a little larger than second, $3\frac{1}{3}$ mm. long, the last two fused together.——Hindwing as in *galaxia*, but

discal glaucous scaling denser and somewhat more extended : white median band broader and longer ; submarginal spots much larger, especially the first four ; admarginal spots heavier, that before SC^2 nearly complete, but thin.

Underside.——Forewing: white discal band 3 to 4 mm. distant from black discal line between M^2 and SM^2, spot R^3—M^1 twice as large as in *galaxia*.——Hindwing : white discal band 8 mm. wide in front, gradually narrowing to R^3, continued to M^2

Fig. 30.

by a thin white line ; median line broken at R^3 and M^1, but not interrupted ; interspace between white band and discal, more evenly curved, line about $1\frac{1}{3}$ mm. ; abdominal median bars (SM^1)—SM^2 close to anal lunules at (SM^1), triangular space at distal side of it rather more white than in *galaxia* ; submarginal white spots heavier.

Hab. Letti (W. Doherty, July 1892), 1 ♀.

Vein M^1 of the left forewing is forked in this specimen, the resp. submarginal spot double on upperside.

5*m.* **E. pyrrhus aloranus** Rothsch., subsp. nov. (Fig. 31, ♀).

Charaxes jovis, Pagenstecher (not Staudinger, 1894), *Jahrb. Nass. Ver. Nat.* LI. p. 193 (1898) (Alor).

♀. *Wings, upperside.*——Forewing: white area as in *galaxia*, but on disc from inner margin to beyond M^2 rather widely edged with pale glaucous, so that the black outer area is posteriorly somewhat narrower even than in *lettianus* ; patch M^1—M^2 very oblique outwardly, the extreme angle of cellule R^3—M^1 scaled glaucous white and spot R^3—M^1 just touching the white area, diameters 3 and 4 mm. resp., separated from spot R^2—R^3, which measures $2\frac{1}{2}$ and 3 mm. in longitudinal and transverse direction respectively, only by the black vein ; spots SC^5—R^2 somewhat longer than in *lettianus* ; submarginal spots as in that race, but posterior two separate. ——Hindwing posteriorly more extended glaucous than in both *galaxia* and *lettianus* ; submarginal spots in size between those of the two allied subspecies ; admarginal spots heavy, seven in number, the first, C^1—SC^2, rounded, all the others transverse, not interrupted.

Underside: bars and lines thinner than in *galaxia* and *lettianus*, except discal line of fore- and hindwing, which is heavier.——Forewing: white discal patch M^1—SM^2 wider than in *galaxia*, but not so wide as in *lettianus*; spot R^3—M^1 in size also between the resp. spot of those subspecies; upper median bars SC^5—R^1 more proximal, and the white patches at their outside larger than in the preceding forms, but not touching discal line; white postmedian interspace of cell wider than in

Fig. 31.

lettianus.——Hindwing: white discal band stopping at R^3, little wider than in *galaxia*, as widely separated from the discal line—which has the same shape as in *galaxia*—as in that subspecies; lines SM^2 and SM^3 very thin.

♂. Very close to certain examples of *galaxia*, but submarginal spots of forewing above larger, discal spots R^2—M^1 rounded, larger; discal band of hindwing below extending just beyond R^2, discal bars R^3—M^2 without white external border.

Hab. Alor (A. Everett, April 1897), 1 ♀ (*type*); 1 ♂ in Dr. Pagenstecher's collection.

5*n*. E. pyrrhus jovis (Fig. 32, ♂).

Charaxes jovis Staudinger, *Iris* VII. p. 357 (1894) (Sambawa); Pagenst., *Jahrb. Nass. Ver. Nat.* XLIX. p. 144. n. 85 (1896) (pt.; Sambawa).

Charaxes (*Muruareda*) *joris*, Nicéville & Elwes, *Journ. As. Soc. Beng.* LXIV. II. p. 692. n. 149 (1898) (pt.; Sambawa).

♂. *Wings, upperside.*——Forewing: discal glaucous scaling as in *aloranus*, but posteriorly mostly approaching the submarginal spots, the interspace varying from 2 to 5 mm. at (SM^1); base of cellule R^5—M^1 glaucous white; median patch R^5—M^1 concave outwardly; spot R^2—R^5 obliquely transverse, mostly somewhat luniform, measuring 2 to 3 mm. in basi-apical direction, about 4 mm. transversely, touching

or nearly touching the glaucous scaling between R^3 and M^1 : spot R^2—R^3 small, transversely linear, separated from spot R^3—M^1 by the black vein ; discal spots SC^5—R^2 as in *galaxia*, but mostly a little larger, seldom with some white scales in front : submarginal spots as large as in *lettianus* ♀, the last two mostly merged together, the first often larger than the second, the third the smallest.——Hindwing: discal glaucous scaling (sometimes pale violet) posteriorly more extended than in *aloranus*, the distance between the discal area and the admarginal spot being only 4 mm. midway between M^1 and M^2 ; submarginal spots large, white, but sometimes shaded with glaucous ; admarginal spots R^2—M^2 complete, buffish or whitish in middle, spots SC^2—R^2 mostly also complete, spot C—SC^2 vestigial or absent, as is sometimes spot SC^2—R^1.

Underside of a lighter yellow tint than in *galaxia* ; submarginal region of hindwing little more olivaceous than rest of wing.——Forewing : submedian and

Fig. 32.

median bars M^1—(SM^1) seldom absent, median bar R^2—R^3 separated from discocellular line ; white median spots nearly as in *galaxia*, except patch M^1—M^2, which in specimens with the respective median and submedian bars present does not extend to cell : spot R^3—M^1 varying in size, sometimes larger than in *galaxia* ; submarginal spots larger, more ovate, the two near inner angle especially larger : inner edge of wing white to near inner angle.——Hindwing : submedian and median lines diverging costad, the median line being strongly curved basad ; cellular portion of submedian line thin, barely reaching M ; median line broken at R^3 and M^1, but not interrupted ; white discal band as in *aloranus*, but continued nearly to M^2 by the clearly white border of median bars R^3—M^2 ; interspace between band and discal black line narrower than in *galaxia* and *aloranus*, but wider than in *lettianus* ; discal spots paler red than in *galaxia*, their black outer border mostly thinner ; black submarginal spots smaller than in *galaxia* ; discocellular bar vestigial.

♀. Unknown.

Hab. Sambawa, 4 ♂♂.

5o. **E. pyrrhus kalaonicus** Rothsch., subsp. nov. (Fig. 33, ♀).

♂. Unknown.

♀. *Wings, upperside.*——Forewing: white median band variable in extent, wider between M^2—SM than in all the preceding subspecies, from 2 to 7 mm. distant from submarginal spot M^2—SM^2, with glaucous scaling at outer edge; basally the band extends to origin of M^2; base and cell white as in *jovis*; discal patch R^3—M^1 varying in length at R^3 from 4 to 8 mm., basal edge straight or concave, base of cellule R^2—R^3 scaled glaucous white: spot R^2—R^3 $2\frac{1}{2}$ to 4 mm. long at R^3: two upper median spots SC^5—R^2 heavy, both concave basally, the first 4 to 5, the second $2\frac{1}{2}$ to $3\frac{1}{2}$ mm. long: submarginal spots mostly heavier than in *jovis* ♂.——Hindwing as in *jovis* ♂, but discal scaling more extended between

Fig. 33.

R^1 and R^3, and less extended between R^3 and M^2, the black area being, therefore, comparatively narrower in middle and wider behind than in *jovis*; glaucous scales along (SM^1), dividing the black anal patch; submarginal spots white, larger than in *jovis* ♂: admarginal spots somewhat thinner, strongly constricted in middle, spot before SC^2 complete, linear, or divided, yellow spot less heavy than in *jovis* and *aloranus*.

Underside.——Forewing: submedian and median bars M^1—(SM^1) mostly absent, but in one example bars M^1—M^2 are present, fused; median bar R^2—R^3 very thin, fused at both ends with bar D, the interspace extremely thin; white median patch M^2—SM^1 extending in two specimens to discal black bar, in a third individual it nearly touches that bar, while in the fourth example it is 3 mm. distant from it.——Hindwing: submedian and median lines anteriorly not divergent, bent towards each other at edge of wing, or even joining each other, farther apart in front of cell than in *jovis*; white discal band as in *lettianus*, broader than in *jovis*, interspace between band and discal black line wider than in *lettianus*.

Abdomen beneath in one ♀ nearly all white.

Hab. Kalao (A. Everett, December 1895), 4 ♀♀.

As in the closely allied form from Sumba the sexes do not differ essentially in the shape of the median band and the form of the submedian and median lines of the hindwing, we must expect that the ♂♂ of *kalaonicus* will differ from the ♂♂ of *joris* in nearly the same way as the ♀♀ of *kalaonicus* do.

Sp. **E. pyrrhus scipio** Rothsch., subsp. nov. (Fig. 34, ♀).

Charaxes sp., Doherty, *Journ. As. Soc. Beng.* LX. II. p. 174. n. 48 (1891).

Charaxes joris Pagenstecher (non Standinger, 1894), *Jahrb. Noss. Ver. Nat.* XLIX. p. 114. n. 85. t. 2. f. 6. ♂ (1896) (Sumba).

Charaxes (*Muruvarda*) *joris*, Nicéville & Elwes, *Journ. As. Soc. Beng.* LXIV. II. p. 692. n. 149 (1898) (pt. : Sumba).

Forewings in both sexes more falcate than in any other *pyrrhus* form.

♂♀. *Wings, upperside.*——Forewing as in *kalaonicus* ♀, white area only 2 to 3 mm. from submarginal spots M^2—SM^2, with diffused glaucous scaling at edge;

Fig. 34.

upper discal spots SC^5—R^2 mostly much larger than in *joris* and *kalaonicus*, the first up to 8 mm. long, mostly with a white line in front; submarginal spots as heavy as in *kalaonicus* or heavier.——Hindwing in ♂ as in *joris* ♂, but black area wider between M^1 and M^2; in ♀ as in *kalaonicus* ♀, but discal scaling a little less extended distad in middle.

Underside.——Forewing: submedian and median bars M^2—(SM^2) mostly absent, but in several specimens represented by one black spot; bars M^1—M^2 present in all examples, but often more or less completely merged together; median bar R^3—M^1 curved distad at M^1, often very oblique; white discal patches and spots as large as

in *kalaonicus* or larger ; discal line of black bars more strongly bent basad behind R^2 than in *kalaonicus*.——Hindwing : submedian and median lines nearly as in *joris*, anteriorly farther apart than in *kalaonicus* ; white discal band as in *joris*.

Abdomen of ♀ often all white beneath.

Hab. Sumba (W. Doherty, February 1896 ; A. Everett, November and December 1896), 5 ♂♂, 7 ♀♀.

Type : ♀ with abdomen white beneath.

Doherty (*l.c.*) says : "A very large *Charaxes* apparently of the *eudamippus* group was several times seen in the mountains of Sumba, and again in those of Sambawa. Unlike *C. eudamippus*, which is a ground butterfly, it always alighted high up on trees, so that I could never catch it. Another species, something like *C. pyrrhus*, was once seen in Sumba." Whether the insects here alluded to belonged to two species instead of one we do not know ; but as *joris* on Sambawa and *scipio* on Sumba are now known not to be very rare, it is very likely that the species of the "*eudamippus* group" was really a *pyrrhus* form, while the form resembling "*pyrrhus*" was most probably the *Charaxes* described by me as *sumbanus*.

5q. E. pyrrhus sempronius (Fig. 35, ♂).

Papilio Nymphalis sempronius Fabricius, *Ent. Syst.* III. 1. p. 62. n. 194 (1793) (Patria ?).
Jasia australis Swainson, *Zool. Ill.* II. t. 114 (1833) (Careening Bay ; Pt. Nelson ; N.W. Australia).
Nymphalis sempronius Godart, *Enc. Méth.* IX. p. 354. n. 12 (1823) ; Doubl. & Westw., *Gen. Diurn. Lep.* II. p. 309. n. 27 (1850) (Australia).
Charaxes tyctaeus Felder, *Wien. Ent. Zeit.* III. p. 399. n. 42. t. 9. f. 3 (1859) (N. India).
Charaxes sempronius, Butler, *P. Z. S.* p. 633. n. 42 (1865) (Australia) ; id., *Cat. Diurn. Lep. descr. Fabr.* p. 51. n. 4 (1869) (Sydney) ; Semper, *Journ. Mus. Godeffroy* XIV. p. 16. n. 44 (1878) (Rockhampton ; Bowen ; Pt. Denison ; Cape York) ; Staud., *Exot. Schmett.* p. 173 (1886) ; Edwards, *Insect Life* II. p. 13 (1889) (stridulation) ; Olliff, *The Austral. Museum* II. p. 98 (1889) (Lord Howe Island) ; Walk., *Ent. Mo. Ma.* XXVII. p. 283 (1891) (Adelaide R. ; N.W. Austr.) ; Fraser, *ibid.* XXXI. p. 14 (1895) (N. S. Wales) ; Butl., *Journ. Linn. Soc. Lond.* XXV. p. 388. n. 106 (1895) (Queensland ; Sydney).
Charaxes (*Nymphalis*) *sempronius*, Koch, *Indo-Austr. Lep. Fauna* p. 50 (1865) (p. parte : Sydney ; Hunter R. ; Clarence R.).

♂. *Wings, upperside.*——Forewing : white (or creamy) area larger than in *scipio*, reaching (or nearly reaching) submarginal double-spot M^2—SM^2, submarginal spot M^1—M^2 sometimes also joined to the white area ; base of cellule R^5—M^1 all white, or the black discocellular line extending into this cellule ; patch R^5—M^1 extending at M^1 at least halfway to submarginal spot R^5—M^1, its outer edge oblique ; spot R^2—R^5 about one-third the size of the patch R^5—M^1 ; upper median spots SC^5—R^5 as in Sumba form or smaller, sometimes with a white line in front ; upper angle of cell occupied by a rather small black spot ; submarginal spots smaller than in *scipio*, the first in North Queensland examples sometimes minute, the second $1\frac{1}{2}$ to 3 mm. long.——Hindwing : black area rather variable in width, generally more restricted than in *scipio* ; in one North Queensland specimen of my collection much reduced from R^1 to SM^2, the discal glaucous scaling extending near the veins to near the admarginal spots ; submarginal spots small, often minute, dot M^1—M^2 sometimes absent ; admarginal spots R^1—SM^2 complete, narrowed and yellowish in middle, spot SC^2—R^1 absent or small, spot C^1—SC^2 sometimes indicated.

Underside tawny olive.——Forewing : submedian and median bars M^1—(SM^1) absent ; median bar R^5—M^1 mostly present, having the form of a distinct bar or of a patch ; bar R^2—R^5 completely fused with discocellular line ; bar R^1—R^2 mostly

arched, sometimes straight ; cell-bar 3 very heavy, cell-bar 4 anteriorly joining bar D, interspace between the last two bars often not wider than cell-bar 4 itself ; discal line rather strongly incurved behind R^2, sometimes completely broken at this vein ; submarginal white spots very heavy, white discal band sharply defined distally, extending from cell to discal line from inner margin of wing to beyond M^2, patch M^1—M^2 obliquely cut off behind M^1, patch R^3—M^1 sometimes also reaching close to discal line.——Hindwing : submedian line often extending beyond M, with heavy white border; median line strongly broken at C; bar R^2—R^3 reaching M just at origin of M^1 ; bar M^2—(SM^1) sharply angle-shaped, mostly joined to the last black lunule of the discal series ; oblique abdominal bars (SM^1)—SM^3 with upper end generally touching the same lunule, triangular space at distal side of this bar shaded with white ; white discal band very broad, tapering behind, reaching to M^2

Fig. 35.

Fig. 35a.—Clasper.

Fig. 35b. Segment 10 and clasper from above.

or at least extended beyond M^1, widest behind C, separated from discal line of bars by a narrow blackish brown or tawny olive interspace which is seldom as wide as in *scipio* ; white line at distal side of discal line between C and R^2 heavy, shining through above : discal spots coloured as in *jupiter*, posterior ones not heavier than in *scipio*, spots SC^2—R^2 with rather heavy silvery scaling at outside ; submarginal white spots luniform or subluniform, black ones more or less rounded ; black lines upon SM^2 and SM^3 thin, the former obsolete towards base ; abdominal region shaded with white scales.

♀. Mostly considerably larger than ♂.

Upperside.——Forewing : white area and spots often more extended than in ♂ ; submarginal spots M^1—SM^2 often merged together with the white basi-discal area. ——Hindwing : anterior submarginal spots larger than in ♂ ; posterior ones small, often strongly shaded with glaucous.

Underside.——Forewing: white area more extended than it is generally in ♂; subbmedian and median bars M^2—M^1 often present, but fused together; median bar R^3—M^1 seldom entirely absent; white discal band broader, extended to discal line, from which it is seldom separated by a narrow olive-tawny interspace; occasionally the band is prolonged to the abdominal triangular patch standing at proximal side of the last black discal lunule, in which case median bars M^1—SM^2 are more proximal than usually; black submarginal spots larger and more transverse than in ♂.

In the white cellular patch of the forewing below there appear rarely black dots, either isolated or joined to the black bars.

Length ♂ forewing,		costal margin	47	mm.,	internal margin	33	mm.
,,	,, hindwing,	,,	28	,,	,,	32	,,
,,	,, forewing,	,,	37	,,	,,	24	,,
,,	,, hindwing,	,,	21	,,	,,	24	,,
,,	♀ forewing,	,,	57	,,	,,	40	,,
,,	,, hindwing,	,,	35	,,	,,	39	,,
,,	,, forewing,	,,	48	,,	,,	32	,,
,,	,, hindwing,	,,	28	,,	,,	30	,,

Larva and chrysalis, see p. 573.

Hab. Queensland, 5 ♂♂, 10 ♀♀: N.W. Australia; N. S. Wales, 1 ♂, 8 ♀♀: Lord Howe Island.

Variation.—As said in the above description, the white area of the wings varies considerably. On the whitest specimens Felder's *tyrtaeus* is founded; but we do not think that even Felder would have treated these extreme individuals as specifically distinct from *sempronius* if he had not been under the wrong impression that his *tyrtaeus* came from North India; he compares it with *pyrrhus* only, not with *sempronius*. The same form is figured by Swainson from N.W. Australia as *australis*.

Habits.—Semper (*l.c.*) says: "The imagines like to settle on the trunks of trees, of which they suck the exuding sap; they are then drowsy, and are easily caught."

Fraser (*l.c.*) records: "The Australian Empéror (*Charaxes Sempronius*) is another camphor-tree insect, but it also feeds on some of the wattles. A truly grand creature he is . . . and particularly noticeable from the wonderful rapidity of flight. I seldom saw them rest for more than a few moments, but they would glide swiftly up and down between the long rows of orange trees, then suddenly rise and flash out of sight over the tops of the forest trees."

Mr. Edwards (*l.c.*) says of this insect: "The *Charaxes* as it alights upon a bunch of the beautiful and sweet-scented flowers of *Bursaria spinosa* closes its wings with a grating sound not unlike that of the *Prepona*, and repeats the same as it is disturbed from its resting-place."

6. **Eulepis cognatus** (Fig. 33, ♂).

Charaxes cognatus Vollenhoven, *Tijdschr. v. Ent.* IV. p. 159, t. IX. p. 1, 2 (1861) (Moluccas): Butl., *P. Z. S.* p. 634, n. 44 (1865); Staud., *Exot. Schmett.* p. 173 (1886) (Celebes); Rothsch., *Iris* IV. p. 437 (1892) (S. Celebes); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 386, n. 101 (1895) (Moluccas!).

Nymphalis cognatus, Kirby, *Cat. Diurn. Lep.* p. 271, n. 42 (1871).

♂. Body above olivaceous black, head and pronotum with the usual white dots:

underside white, sterna with black oblique stripes underneath the femora : anterior tibiae and external side of femora black.

Wings, upperside : black marked white and blue.——Forewing falcate: a nearly straight band of discal spots from internal margin to R^3, the posterior one about 5 mm. long, and like the submedian patch, which is more or less obviously divided by the submedian fold, edged with blue scaling, especially broadly so at the distal side, spot M^1—M^2 convex proximally, about 3½ mm. in diameter, spot R^3—M^1 much smaller, spot R^2—R^3 close to cell, small: upper discal spots SC^5—R^2 small, the anterior one often scarcely indicated, a little more proximal than the other ; a series of six submarginal, sometimes slightly buffish, small spots, following in position the curve of the distal margin of the wing, submedian one often obsolete, 2 and 3 minute.——Hindwing : a white discal band reaching to (SM^1), 5 to 6 mm. broad in front, slightly narrowing towards M, then triangular ; disc from R^1 to (SM^1) light blue, this area nearly reaching anal angle of wing, only 5 mm. from distal margin between M^1 and M^2, narrowing costad from R^1 to R^1 : there is blue scaling also at the proximal side of band in and below cell : a complete series of

Fig. 36.

transverse, small, white submarginal spots ; admarginal blue spots interrupted, forming triangles at veins, anal one complete with the upper half yellow ; abdominal fold grey, showing a triangular paler grey patch beyond tip of SM^3 ; tails long and slender, first 8 mm., second 6½ mm.

Underside.——Forewing: cell-bar 3 straight, joined along M and SC^1 to the thinner cell-bar 4, the juncture continued along subcostals and R^3 to the heavy bar D ; submedian bars M^1—(SM^1) close to origin of M^2, continuous with each other, joined along (SM^1) to median bar M^2—SM^2 ; median bar M^1—M^2 very deeply curved, the horns of the half-moon pointing distad and reaching the distal bars; bar R^3—M^1 oblique, either also arched, or nearly straight, touching discal bar at M^1; median bar R^2—R^3 fused with bar D; bars SC^5—R^2 almost straight, placed obliquely to the veins ; discal bars SC^1—R^1 very slightly curved, following one strongly oblique, gently curved, pointing basad at R^2: bar R^3—R^3 much more proximal, and, like the following three, strongly arched : discal white patches bordered proximally by the median bars, patch M^2—SM^2 separated from respective black discal lunule by a brownish black, proximally convex, patch of 2 to 2½ mm. width, patch M^1—M^2 also separate from the discal luniform bar, while patch

R^3—M^1 touches the discal bar; at distal side of discal bars a white band of more or less confluent spots, of which the distal edge is sometimes not sharply defined and which include the postdiscal bars; these are luniform, the upper ones down to M^2 more or less obsolete or quite absent, the last two, M^2—SM^2, black, fused to form a mark resembling the number 3; basal and median interspace of cell, base of costal margin, internal marginal area (extending basally to cell) and interspace between median bars SC^5—R^2, and nearly the whole interspace between median and discal bars R^2—R^3, white; internal marginal area externally black along SM^2; rest of wing russet, external marginal area paler.——Hindwing: submedian line of bars heavy, extending just beyond M; median bars also heavy, bar M^1—M^2 situated along M^2, bar M^2—(SM^1) more distal, joining bars (SM^1)—SM^2, which are not separated from each other, forming one line that stands at right angles to SM^2 and is gradually dilated posteriorly: discal white band as above, extending to M^2, slightly narrowing down to R^2, then strongly triangular: discal bars C^1—R^2 heavy, forming a continuous curved line that stands immediately at the edge of the white band; discal bar R^2—R^3 very short, not reaching R^3, fused with the postdiscal black bar to form a linear spot behind R^2; discal bars R^1—SM^2 luniform, well separated from each other; postdiscal rufous red spots placed as in *pyrrhus*, first oblique, very narrow behind, scarcely (or not) touching SC^2, separated from discal bar by a bluish white lunule, and externally bordered by the very thin postdiscal black bar, spots SC^2—R^2 absent; the postdiscal bars close to the discal ones, from which they are separated by white bars; postdiscal bar SC^2—R^1 with patch of white scales at outer side; rufous red spot R^3—M^1 oblique, ovate, the next two somewhat bean-shaped, all three edged black distally and bluish white or (the last) nearly blue proximally; submarginal black bars transverse, linear; white submarginal spots of the same shape, broader; admarginal spots also transverse, not interrupted at the internervular folds, ochraceous, with blue triangles at the tips of the posterior nervules; marginal black line lead-colour in certain lights; basal area up to submedian bars and (SM^1) white, with the scales of the under layer more or less dark brown; interspace between submedian and median bars and outer area of wing russet, paler towards submarginal spots and between SC^2—R^1.

♀. Unknown; probably not essentially different from ♂, judging from the allied species.

Hab. South Celebes: Maros country (W. Doherty, August—September 1891, 7 ♂♂.

The species is described from the "Moluccas," under which name the island of Celebes was formerly included; it does not, of course, occur on the Moluccas proper. As Everett and Fruhstorfer did not meet with *cognatus*, and Doherty also did not succeed in finding it again during his trip to Palos Bay in 1896, it must be a rare insect. In the forewing being much more strongly falcate than in the Moluccan forms of *pyrrhus*, *E. cognatus* possesses a remarkable character found in so many Celebensian *Nymphalidae* and *Papilionidae*. Most authors have associated *E. cognatus* with *E. schreiber*, but *cognatus* is, in fact, a Celebensian representative of *E. pyrrhus*, with which it agrees in the development of the cell-bars, the discal and postdiscal bars, and submarginal spots of the forewing, while it disagrees in these markings entirely with *schreiber*. The presence of the rather bright blue discal scaling on the upperside of the wings of both *cognatus* and *schreiber* was probably the reason why the species were associated with one another; but this character is of no significance, as the blue scaling is also found in *pyrrhus*, though it has there a less bright tint.

A¹. Submedian and median bars of hindwing below converging behind, fused at M.

7. Eulepis kadeni (Fig. 37. 38).

(?) *Nymphalis dehaani* Doubleday, Westwood, & Hewitson, *Genera Diurn. Lep.* II. p. 308 (1850) (Eastern Archipelago).
Charaxes kadenii Felder, *Wien. Ent. Mon.* IV. p. 232. n. 79. t. 3. f. 2 (1860) (Java).

♂. Body above olivaceous black, beneath white, edges of abdominal segments black; head and pronotum with the usual dots; sterna black under the femora; legs black, with scattered white scales, anterior tarsi white.

Wings: upperside black, olive towards base, with large discal cream-coloured area which is pale glaucous at edge.——Forewing: black bars of underside showing through; creamy white area 18 to 20 mm. wide at internal margin, reaching to R^2, outer edge more or less sinuate between M^1 and M^2 and also between R^5 and M^1, upper patch (before vein R^5) much smaller than that behind it, extended to D, with median bar R^2—R^3 vestigial or showing through from underside; a solitary discal spot R^1—R^2, lower angle of apex of cell more or less extended creamy; often a number of tiny submarginal spots indicated, sometimes there is also a slight trace of a discal spot before R^1.——Hindwing: discal area stopping at abdominal fold, extended distad beyond curve of R^3; close to edge of area there are often several pale glaucous blue lunules, the last one always marked; four submarginal, linear, white markings between SC^2 and M^1, the last oblique; there is seldom a trace of an additional line before SC^2, while there are two more very short lines between M^1 and (SM^1), the latter of the two being often continued to SM^2; admarginal spots blue, upper ones thin, those between R^3 and M^2 heavy, extending to near tip of tails, anal one broader, yellow in middle; fringe white between veins; abdominal fold black, with a bluish white scaling, a blue and white patch beyond tip of SM^2; tails long, curving towards each other, upper tail 11 to 14 mm., second 9 to 12 mm. long.

Underside white.——Forewing: basal and costal region milky white, distal marginal area olive, becoming gradually paler towards postdiscal spots; base of costal and subcostal nervures black; both cell-bars heavy, straight (or nearly so), obliquely pointing distad with upper end; bar D also heavy, of about the same width as the bars on disc; two submedian bars, the second generally fused with the corresponding median bar, both not extending beyond (SM^1), while the upper one is continuous with upper cell-bar; median bar M^1—M^2 somewhat curved, not prolonged along veins as in *cognatus*, placed just beyond origin of M^1; median bar R^3—M^1 more distal, shorter, also curved; bar R^2—R^3 close to D^5, but separate; bars $SC^{1,2}$—R^2 more or less fused to form one heavy, gently curved, line; discal bars SC^3—R^2 heavy, fused, forming another heavy line, which is indented at the veins; bar R^2—R^3 subquadrate, much more proximal than the others, the following discal bars R^3—SM^2 thin, luniform; postdiscal bars developed to more or less rounded spots, the posterior ones in the Sumatra form rather weak.——Hindwing: submedian and median bars fused to two heavy lines, about 1½ mm. broad, converging behind, fusing at M and then running down to near last discal lunule, where the line meets the median bar (SM^1)—SM^2, which stands about at right angles to SM^2, slightly inclining basad, and is dilated behind; discal bars luniform, upper three fused to a concave line, fourth forms (as in *cognatus*) together with the postdiscal bar a long

black heavy line, bar R^3—M^1 oblique, all these bars with clayish tawny scaling at proximal side, except the long lunule M^2—SM^2, the upper three and last three edged blue-white distally; submarginal interspace C—R^2 olivaceous isabella-colour, postdiscal bar C—SC^2 fused with respective discal one, postdiscal bars SC^2—R^2 not well defined, the former with white scaling at distal side; between R^3 and SM^2 the postdiscal bars are luniform, 3 to 5 mm. distant from discal ones, the interspaces filled by maroon-red patches; submarginal white spots linear, thin, spots R^3—SM^2 curved, spot C—SC^2 vestigial or absent; black submarginal bars more or less lead-colour, fused with the marginal line; three admarginal yellow spots from R^3 to SM^2, the anal one large; pale blue spots at tips of veins, that behind R^3 and the one before M^2 extending to near tip of tails; fringe of abdominal margin black; area enclosed by SM^2, (SM^1), and median bar (SM^1)—SM^3 black, densely sprinkled over with white scales; interspace between submedian and median bars white, like basal, discal, and rest of abdominal area.

♀. Not essentially different from ♂; larger.

Length ♂ forewing, costal margin 40 mm., internal margin 30 mm.
„ „ hindwing, „ 25 „ „ 30 „

Hab. Java and Sumatra, at higher elevation.

The Java form with the less extended white scaling of the upperside and the more clearly marked posterior discal and postdiscal spots of the underside of the forewing represents the less specialized of the two known geographical races of *kadeni*.

Dr. Butler (*Journ. Linn. Soc. Lond.* XXV. p. 386) considers *kadeni* to be intermediate between the "*athamas* and *schreiberi* groups": it is, however, more closely allied to *cognatus* and *pyrrhus* in the development of the markings than to either *athamas* or *schreiber*.

In Doubleday's *Genera of Diurn. Lep.* II. p. 308, we read under *Nymphalis* (= *Charaxes* auct.): "A very remarkable and beautiful new species in the museum of the Jardin des Plantes has the tails well developed, but instead of being straight and parallel they are curved, so that the tips of each pair converge, nearly meeting together. It is a native of the Eastern Archipelago, and has been named in MS. N. De Haanii."

This *dehaani* is most probably our insect, but the above description of the shape of the tails is not sufficient to remove all doubts: for if in long-tailed *Eulepis* and *Charaxes*, when set out, the tails become slightly twisted, they appear to be curved, pointing towards each other; it is possible (though not probable) that the insect referred to as *dehaani* had the tails converging towards each other for the same reason, and was not *kadeni*.

7*a*. E. kadeni kadeni (Fig. 37, ♂).

Charaxes kadenii Felder, *Wien. Ent. Mon.* IV. p. 232. n. 79. t. 3. f. 2 (1860) (Java); Wallace, *Malay Arch.* ed. II. p. 114. fig. on p. 113 (1869) (Java); Kirby, *Cat. Diurn. Lep.* p. 271. n. 39 (1871) (Java); Staud., *Exot. Schmett.* p. 173 (1886) (Java); Butl., *Journ. Linn. Soc. Lond.* XXV. p. 386. n. 98 (1895) (Java).

Charaxes kadenii (!), Butler, *P. Z. S.* p. 633. n. 41 (1865) (Caraccas !!).

Eulepis kadenii, Moore, *Lep. Indica* II. p. 263 (1895) (Java).

Charaxes kadeni, Fruhstorfer, *Berl. Ent. Zeit.* XLI. p. 302 (1896) (Gede, 4000 feet); id., *Ent. Nachr.* p. 236 (1897) (♀, Gede, 4000 feet).

♂. *Wings, upperside.*—Forewing: white area extended basad to origin of M^2, its ill-defined outer edge at M^2 at least 5 mm. distant from distal margin of wing;

white scaling in cell restricted to a small patch which reaches from lower angle of cell to about half or two-thirds the way to origin of M^2: outer edge of area biconcave between R^3 and M^2.——Hindwing: white area basally not extending beyond origin of veins D^1 and M^2, base of cell black; yellow anal spot $1\frac{1}{2}$ to 2 mm. broad.

Underside.——Forewing: discal lunules M^2—SM^2 and corresponding postdiscal spots nearly as well developed as respective markings M^1—M^2; blackish olive scaling between white discal band and discal black bars not wider than $1\frac{1}{2}$ mm between veins C^1 to R^3.

♀. Larger than ♂: black area of distal margin narrower, anal yellow spot larger.

Fig. 37.

Hab. West Java: Mt. Gede, 4000 feet (Prillwitz). 6 ♂♂; one ♀ in coll. Fruhstorfer.

Wallace (*l.c.*) says of the only specimen he obtained in West Java in October 1861: "One day a boy brought me a butterfly between his fingers, perfectly unhurt. He had caught it as it was sitting with wings erect, sucking up the liquid from a muddy spot by the roadside. Many of the finest tropical butterflies have this habit, and they are generally so intent upon their meal that they can be easily approached and captured. It proved to be the rare and curious *Charaxes kadenii*, remarkable for having on each hindwing two curved tails like a pair of callipers. It was the only specimen I ever saw, and is still the only representative of its kind in English collections." Mr. de Nicéville (*Journ. As. Soc. Beng.* LXIV. II. p. 434. 1895) remarks that "Dr. Wallace obtained the first known specimen of *C. kadenii* in 1861." This is not correct, as Dr. Felder described the species in 1860 from Kaden's collection.

7*b*. E. kadeni sulthan (Fig. 38, ♂).

Charaxes (*Eulepis*) *kadenii*, Nicéville & Martin (non Felder, 1860), *Journ. As. Soc. Beng.* LXIV. II. p. 434. n. 255 (1895) (Sumatra).
Charaxes kadenii Feld. var. *sulthan* Hagen, *Iris* p. 181. n. 242 (1896) (Sumatra).
Charaxes kadeni var. *sumatrana* Hagen, *l.c.* p. 184. sub n. 242 (1896) (Sumatra).

♂. *Wings, upperside.*—— Forewing: distal edge mostly more straight; white area extending basad beyond origin of M^2, and distad nearer to distal edge of wing

than in the Java form, the black marginal area being at M^3 only 3 mm. wide; the area is also less obviously concave between M^1 and M^2; cell nearly all white, white scaling at least much more extended than in *kadeni kadeni*.——Hindwing: yellow anal patch 3 mm. wide; white area extending to base.

Underside.——Forewing: black discal and postdiscal spots M^1—SM^2 very small, preceding spots also smaller than in Java form.——Hindwing: scaling between white discal band and discal black bars clayish tawny, twice as wide as in Java race, anal yellow spot also much larger; silvery scaling in submarginal interspace SC^2—R^1 less extended.

Fig. 38.

♀. Unknown.

Hab. Sumatra, at higher elevation: Karo country and Plateau of Tobah, 3 ♂♂.

Dr. Martin received from his collectors during two years only seven specimens of the species from the Central Plateau of N.E. Sumatra, and he says (*l.c.*) that "nearly all were captured on the faeces of Karboum buffaloes, deposited on the sandy river banks where the buffaloes used to drink."

The specimen figured has an additional black line on the underside of the forewing in front of M^2.

(*To be continued.*)

EXPLANATION OF PLATES V. TO XIVa.

PLATE V.

Fig. 1. *Eulepis pyrrhus seitzi* ♀, p. 585, Tenimber Islands.
„ 2. *Charaxes ansorgei* ♂, Uganda.
„ 3. „ *azota* ♂, Delagoa Bay.
„ 4. „ *tavetensis* ♂, Taveta, E. Africa.
„ 5. „ *etesipe* ♂, suffused aberration, Sierra Leone.

PLATE VI.

Fig. 1. *Charaxes mixtus* ♀, Cameroons.
„ 2. *Eulepis pyrrhus keiensis* ♀, p. 578, Kei Islands.
„ 3. *Charaxes blandus* ♂, German E. Africa.
„ 4. „ *anticlea* ♀, Sierra Leone.
„ 5. „ *imperialis* ♀, Sierra Leone.

PLATE VII.

Fig. 1. *Charaxes fabius hannibal* ♀, Celebes.
„ 2. „ „ *sumatranus* ♀ (subsp. nov.), Sumatra.
„ 3. „ *latona diana* ♀, Neu Hannover.
„ 4. „ *odysseus* ♀, St. Thomas.
„ 5. „ *thomasius* ♂, „

PLATE VIII.

Eulepis eudamippus, various forms. ♂ ♂.

Fig. 1. Darjeeling.
„ 2. Shan States.
„ 3. „
„ 4. Formosa.
„ 5. China.
„ 6. „

PLATE IX.

Fig. 1. 2. *Eulepis dolon* ♂ ♂, Sikkim.
„ 3. „ *nepenthes* ♂, Upper Tonkin.
„ 4–6. *Charaxes zoolina zoolina* ♂ ♂, ♀, Natal and Delagoa Bay.
„ 7. 8. „ „ *betsimiseraka* ♂, ♀, Madagascar.

PLATE X.

Fig. 1. *Eulepis athamas* ♂, Sikkim, March.
„ 2. „ „ ♂, „ June.
„ 3. „ „ ♂, „ March.
„ 4. „ „ ♀, „ November.
„ 5. „ „ ♂, „ October.
„ 6. „ *arja roberi* ♂, Khasia Hills.
„ 7. „ *athamas* ♂, Kandy.
„ 8. „ „ ♂, S.E. Borneo.
„ 9. „ „ ♂, Khasia Hills.
„ 10. „ „ ♂, Shan States.
„ 11. „ „ ♂, N.E. Sumatra.

PLATE XI.

Various forms of *Eulepis athamas*.

Fig. 1. ♂ from Java.
„ 2. ♂ „ Lombok.
„ 3. ♀ „ Java.
„ 4. ♀ „ Sambawa.
„ 5. ♂ „ Lombok.
„ 6. ♂ „ Sumba.
„ 7. ♂ „ Mindoro.
„ 8. ♀ „ „
„ 9. ♀ „ Palawan.
„ 10. ♂ „ „
„ 11. ♂ „ Wetter.
„ 12. ♂ „ Timor.

PLATE XII.

Fig. 1. *Eulepis schreiberi schreiberi* ♂, Borneo.
„ 2. „ „ *vardi* ♂, Kanara.
„ 3 to 7. Forms of *Eulepis moori*.
„ 3. ♂ from the Naga Hills.
„ 4. ♂ „ Perak.
„ 5. ♀ „ Java.
„ 6. ♂ „ Singapore.
„ 7. ♂ „ Nias.
„ 8 to 12. Forms of *Eulepis hebe*.
„ 8. ♂ from Java.
„ 9. ♂ „ N. Borneo.
„ 10. ♂ „ N.E. Sumatra.
„ 11. ♂ „ Bali.
„ 12. ♀ „ Java.

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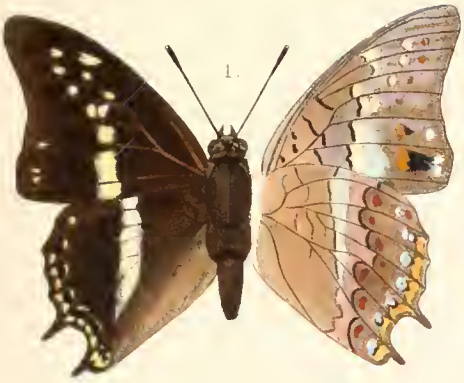

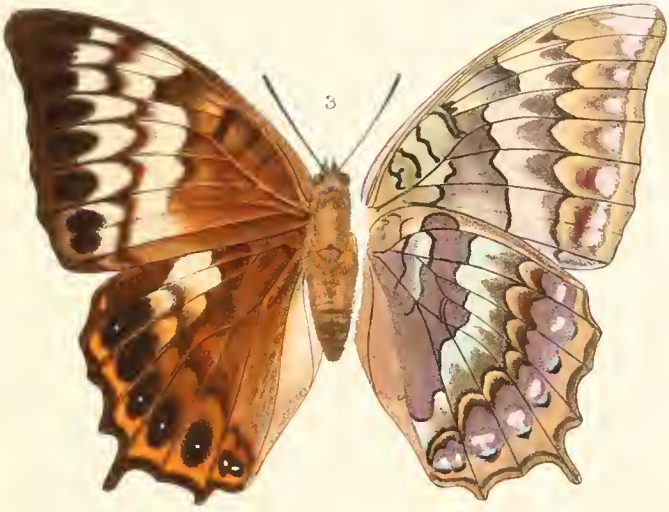

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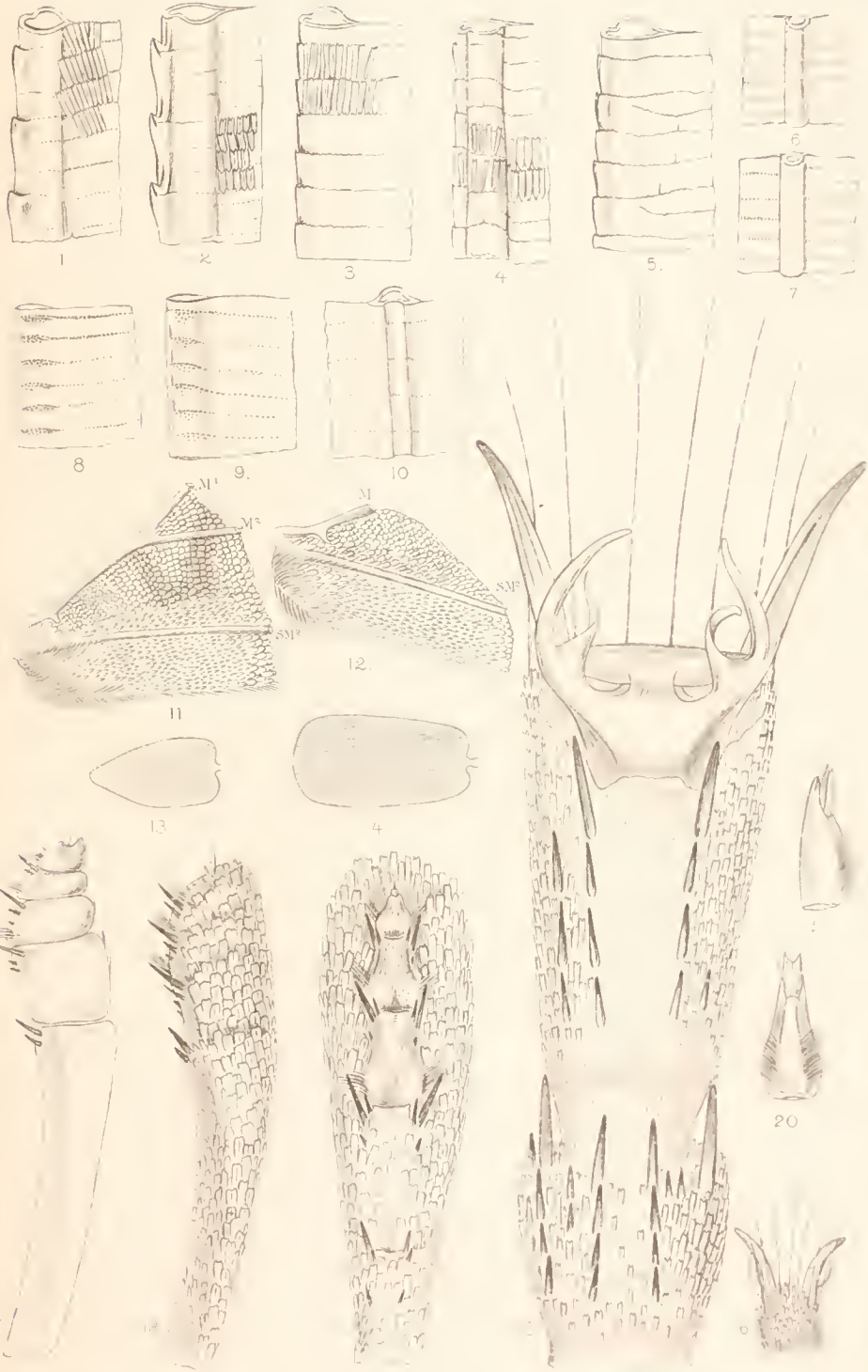
PLATE XIII.

Fig. 1. Portion of the costal margin of the forewing of *Charaxes tiridates*, upperside.
„ 2. The same, underside.
„ 3. The same of *Eulepis pyrrhus sempronius*, upperside.
„ 4. The same, underside.
„ 5. The same of *Ch. borneensis*, upperside.
„ 6. Portion of radial nervule of forewing of *Cynthia*, underside.
„ 7. The same of *Charaxes fabius*.
„ 8. Costal margin of *Parthenos gambrisius*, upperside.
„ 9. The same, underside.
„ 10. Portion of a radial nervule of *Eulepis athamas*, upperside.
„ 11. Basal portion of inner-marginal region of the underside of the forewing of *E. athamas*.
„ 12. The same of *Palla decius*.
„ 13. Modified triangular scale of the basal patch of *E. pyrrhus*.
„ 14. Scale from the vicinity of the patch of triangular scales of *E. pyrrhus*.
„ 15. Last two joints of hinder tarsi of *E. eudamippus* ♂, underside.
„ 16. Tip of the last joint of the hinder tarsi of the same, upperside.
„ 17. Anterior tarsus of *female* of *Ch. jason*, denuded, lateral view.
„ 18. The same with scaling.
„ 19. The same from underside (another individual).
„ 20. Fifth joint of the anterior tarsi of *female* of *Palla decius*, ventral view.
„ 21. The same, side view.

PLATE XIVa.

Fig. 22. Last abdominal segments of *Ch. jason* ♂, lateral view.
„ 23. The same, the eighth segment removed.
„ 24. The same, the clasper of one side removed.
„ 25. The same, from above.
„ 26. The same, from below.
„ 27. The same of *Palla decius*, as fig. 24.
„ 28. The same, from above.
„ 29. The same, from below.
„ 30. End of abdomen of *Charaxes jasius* ♀, ventral view.
„ 31. The same of *Palla decius* ♀, ventral view.
„ 32. Terminal portion of penis of *Ch. psaphon*.
„ 33. Dorsal plate of tenth abdominal segment of *E. jalysus*.
„ 34. The same, with two apical teeth.
„ 35. The same of *E. eudamippus*.
„ 36. The same of *Ch. varanes*.
„ 37. Penis-funnel of *Eulepis pyrrhus sempronius*, dorsal view.
„ 38. „ „ „ „ „ „ side view.
„ 39. „ „ „ *Ch. latona papuensis*, dorsal view.
„ 40. „ „ „ „ „ side view.
„ 41. „ „ „ *Ch. fabius*, dorsal view.
„ 42. „ „ „ „ side view.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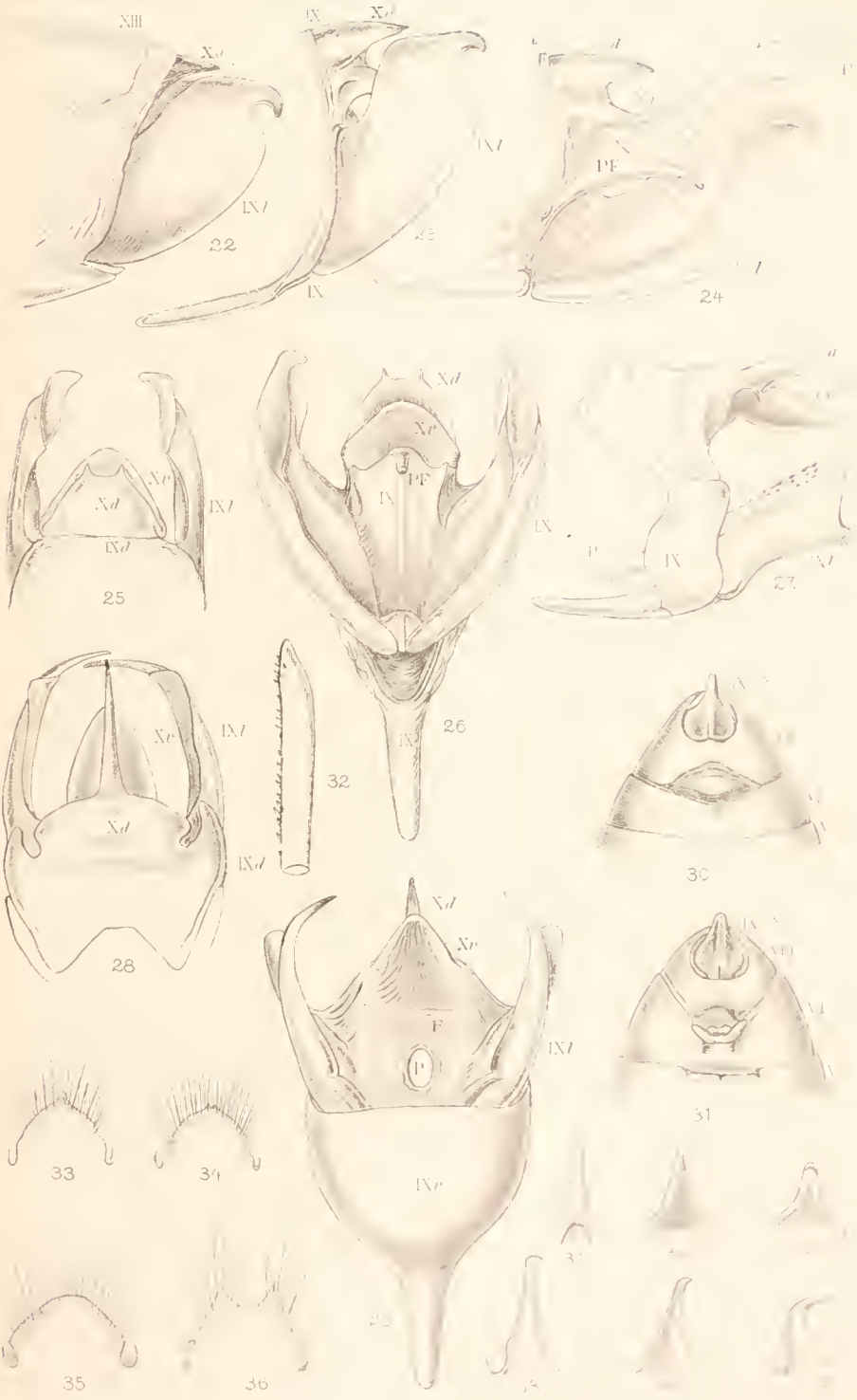
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